THE

PHYSIOLOGY OR MECHANISM

OF

BLUSHING;

ILLUSTRATIVE OF THE INFLUENCE OF MENTAL EMOTION ON THE CAPILLARY CIRCULATION;

WITH A

GENERAL VIEW OF THE SYMPATHIES,

AND

THE ORGANIC RELATIONS OF THOSE STRUCTURES WITH WHICH THEY SEEM TO BE CONNECTED.

BY

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Only cover the human face, and the curtain is instantly dropped over this mirror of the soul; hence the people of all nations leave it bare.—*Bichât*.

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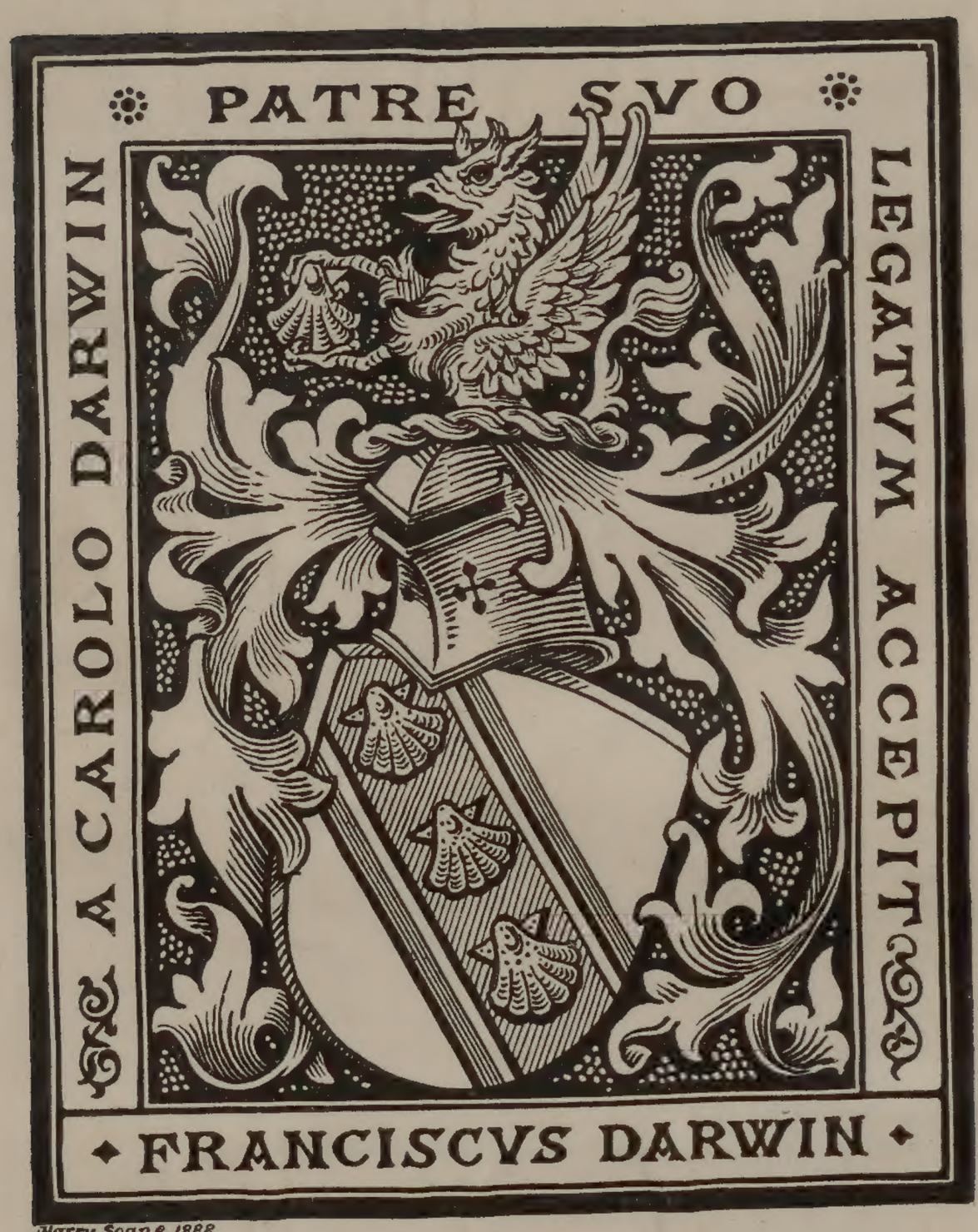

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PREFACE.

THERE is, perhaps, no subject more interesting either to the physiologist or general enquirer, than that which embraces a consideration of the involuntary acts of the mind upon the vital organs and their several functions. The various emotions and sensations excited by these acts, are, indeed, in themselves, sufficiently attractive as matters of contemplation; although, to the medical enquirer, probably less so, than the *physical changes* that are produced in different parts of the body by their agency. It is, therefore, with these changes that the author has principally occupied himself in the following pages.

Of all the alterations resulting from mental emotion, none are more surprising, or more worthy of attentive consideration, than those which take place in the Circulation of the Blood. The wonderful influence which the mind exerts on the movement of the vital fluid (arresting its progress or increasing its velocity according as the impressions made are of a depressing or exciting nature) offers a wide

and fruitful field of investigation. Impressed with this idea, the author has been induced to direct his attention particularly to the phenomenon of BLUSHING, which, from its intimate connexion with the *Sympathies* in general, will be found to afford more ample scope for physiological enquiry than might at first sight be imagined. The close analogy between blushing and inflammation is also another link in the chain of interest its investigation presents to the purely medical enquirer.

In those parts of the subject bearing especially on Anatomy and Physiology, the author has had occasion, in several places, to dissent from the opinions of different writers on the same subject, and has advanced other views which appear to him as more tenable; but he trusts he has always done this in a tone of proper respect. His chief aim throughout this little work has been to draw valid conclusions from well authenticated facts, and by this means to arrive at truths that may in time become of use to science.

3, *North Crescent, Bedford Square,*
February 1839.

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Page 111, line 14th from top, *for* ought to flow, *read* ought not to flow.

ON THE

PHYSIOLOGY OR MECHANISM

OF

BLUSHING.

INTRODUCTION.

WHO has not observed the beautiful and interesting phenomenon of BLUSHING? Who indeed has not had it exemplified in his own person, either from timidity during the modest and sensitive days of boyhood, or from the conscious feeling of having erred in maturer years? When we see the cheek of an individual suffused with a blush in society, immediately our sympathy is excited towards him; we feel as if we were ourselves concerned, and yet we know not why. The condition by which the emotion thus proclaimed is excited, viz., extreme sensibility, the innate modesty and timidity which are the general concomitants of youth, enlist our feelings in favour of the party, appeal to our better nature, and secure that sympathy, which we ourselves may have claimed from others on similar occasions.

There are some, perhaps, who may be inclined to smile at the subject of this Essay. But if these individuals will but reflect on the wonderful mechanism of their being; if they remember that there is not a function, even the simplest, carried on in the economy of man, which is not in the most perfect harmony with all the others, and suggest to themselves that there is a physiology of the mind as well as of the body, perhaps they may be inclined to excuse me for contemplating with wonder and admiration the beautiful illustration of one among the moral laws of nature. Their smiles may give way to pleasing reflections on the unity of design so apparent in creation, in which nothing is superfluous, in which everything that is ordained has some final object, and over which evidently presides an all-wise and bountiful Providence.

We know that the different *passions* affect variously the secretions of the lachrymal gland, mouth, kidney, liver, and most remarkably the mucous membrane of the bowels; and, as Dr. Alison has well observed, the effects of the involuntary acts of the mind (*i. e.*, Emotions and Sensations) on the body deserve *more* attention than they have received from most physiologists. They constitute one important element, which must be taken into account in considering various questions in pathology and therapeutics, and they may serve to give precision to our inquiries into the physiological

uses of those parts of the nervous system which we have reason to suppose are concerned in producing them.

"We do not commonly consider *how much* is given us in life; the daily enjoyment of the boon renders us insensible of the variety and plenitude of its richness: we become more sensible of it when we contemplate the number of tissues that have been formed, the number of properties that are attached to each, the number of organs that are constituted by their aggregation and arrangement, the number of functions that are exercised by these organs, and the number of adjustments by which all are combined and harmonized, and made effectual to the production of one grand result; it is then we perceive how many things must exist, how many relations must be established, how many actions must be performed, how many combinations of actions must be secured, before there can be *sensation*, and motion, and thought, and happiness."

It may also be observed, that most of the objects of organic nature grow up so gradually by our side, that we do not consider them at all in the same way as we should do if they started suddenly upon our vision. Now it is this familiarity with the phenomenon of blushing, which from constant observance appears trivial and of little moment, and the habit of seeing without reflection, that causes it and its relative sympathies to be almost entirely overlooked;

whereas in reality there are no subjects in mental philosophy more deeply interesting than those which the various emotions that produce blushing, sighing, weeping, laughing, &c., afford for speculation. I shall endeavour to demonstrate the intimate connection between the phenomenon of blushing and moral and physical science, generally. With anatomy, in particular, I shall show its relations, in so far as the nerves, skin, and arteries are concerned; with physiology, as regards the mechanism by which it is produced; with comparative anatomy; with the natural history of the human species; and lastly, with moral philosophy, in numerous interesting points of contact.

Blushing is attributed, as has been already stated, to the exquisite sensibility of youth, which, according to the popular belief, wears gradually away in advancing years. This is the idea that strikes the generality of observers, and with this they are satisfied. In short, blushing is a phenomenon of such every-day occurrence, that we never dream of investigating the conditions, moral and physical, upon which it depends.

As this interesting phenomenon has not hitherto, so far as I am aware, been made the subject of a distinct Essay, and as I am convinced that many important physiological points are involved in its consideration, I have been induced to direct my attention to it—for instance, the instantaneous injec-

tion of the minute blood-vessels of the cheek, and the equally sudden disappearance of the abnormal colour after the paroxysm has passed away; also that question which has been so long discussed by medical inquirers, as to whether the ultimate branches of the nerves, by anastomosing, transmit their peculiar energy reciprocally from one to another, or have no such power; and farther, the obvious connection between the phenomena of blushing and those of inflammation, as I shall endeavour to prove hereafter.

In considering the physiology of blushing, the *effect* alone is what I would presume to investigate; the *cause* which produces it, moral and otherwise, remains deep in the obscurity which still encircles the higher attributes of man. The entire phenomenon is certainly intimately connected with the *mens conscia recti*, with the Soul, and as an investigation into the nature of this might prove dangerous, as it would certainly be fruitless, I have held it more advisable to leave it as among the dark mysteries of life, than to attempt fathoming an abyss that knows no limits. In such inquiries "we reach the gulf which human intelligence cannot pass; and, if the presumptuous mind of man shall dare to extend its speculations farther, it will do so only to evince its incapacity and mortify its pride."*

* Sir David Brewster.

The following is the arrangement adopted in this Essay :—

First. A History of the phenomenon of Blushing as observed in the different tribes of the human race, &c.

Second. The Anatomy of the parts engaged in its production, as the brain, nerves, heart, blood-vessels, and skin.

Third. The Mechanism by which all these parts are combined and put in motion before the blush can be excited on the cheek.

Fourth and last. Some observations on the moral and physical treatment of the mental emotions arising from diseased sensibility.

SECTION FIRST.

NATURAL HISTORY OF BLUSHING.

CHAPTER I.

THE POETRY OF BLUSHING.

> La moindre émotion, la moindre agitation, le moindre mouvement un peu violent, y accumulent, y diminuent, y font varier de mille manières la quantité du sang.—BICHAT.

BLUSHING may be styled the poetry of the Soul! In the writings of the earliest lyric and epic poets, we find the phenomenon of Blushing frequently described and alluded to; and where it is mentioned, we may generally perceive that the intention of the author in so doing, was to render the particular passage more *effective*.

The ancient writers (rigid observers of human nature) were well aware that nothing produced a greater effect on the mind of man, than a glowing description or illustration of its own passions. Thus we find the finest passages in their writings are generally descriptions of the internal emotions, as rage, hope, fear, shame, &c.; and Demosthenes,

who has been justly compared, by his rival Æschines, to a siren, from the melody of his expressions, displays his greatest eloquence and energy in describing the various passions of the soul.

When Jupiter disclosed himself to the beautiful Europa, in the Dictean Cave, we are told by Lucian that the fair damsel was downcast with shame and modesty.

Our modern poets, copying, perhaps, partly after their illustrious progenitors, introduce blushing into many of their ballads and romances. The description of this phenomenon is not confined to one language or one country; it has been alluded to by ancient and modern poetic and prose writers, in almost every country from Araby to the Pole. It is the ἐρύθρημα of Homer and Sappho; the *Rubor* of Ovid, Virgil, and Horace; the *Rossore* of Tasso and Ariosto; the *Erroethen* of Zimmerman, Schiller, and Goëthe; and the *Rougeur* of the impassioned Lamartine.

In that expressive, but now almost forgotten dialect, the Gaelic, this phenomenon is not omitted. In this language the words signifying the act of blushing, are eloquently expressive;—they are pronounced thus, as well as I can write them in English characters—"Loss shé soughs," which being interpreted, means "*Her face lit up.*" "Loss shé soughs le nara" being the phrase generally used, signifies, "*Her face lit up with shame!*"

What picture can be more interesting than the virgin cheek in the act of blushing? The eloquent blood sympathizing with every mental emotion, rising and spreading over the cheek—

"———————— giving WARMTH as it flies,
From the lips to the cheek, from the cheek to the eyes,"

affords a beautiful example of that "harmonie poetique" which exists between the mental emotions and sympathetic system in man. When an individual is about to blush, "the whole heart and soul and sense in concert move," transmitting the sensorial impulse from one to the other, and as it were propel the blood by their combination of actions, until it appears in the cheek, where it is—

"Brought forth in purple, cradled in vermilion."

How beautifully is this described by Virgil, in the twelfth book of the Æneid, in that passage relating to the interview between Turnus and Lavinia, prior to the former resuming arms in order to terminate, by single combat, the disastrous war between the Trojans and Rutulians. The passage opens by Amata, the mother of Lavinia, in tears, beseeching Turnus not to engage with the Trojans;—

Accepit vocem lacrimis LAVINIA matris
Flagrantis perfusa genas: cui plurimus ignem
Subjecit RUBOR, et calefacta per ora cucurrit.
Indum sanguineo veluti violaverit ostro
Si quis ebur, aut mixta rubent ubi LILIA multa
Alba rosa: talis virgo dabat ore colores.
Illum turbat amor, figitque in virgine vultus:
Ardet in arma magis; * * *

The imagery of this passage is exquisite! What simile could be more beautiful or expressive than that between the blushing cheek of the fair Lavinia, and the ivory of Indus stained with purple, or the white lily in the bosom of roses? This image is *chasteness* itself, more especially as it emanates from the *purest* of Latin poets. Let us contrast this glowing description with the appearance which *fear* presents.

A man struck with sudden terror (says Van Swietan) grows *pale* and cold, shrinks in every part of his body; his pulse is quick, but low and unequal; the heart palpitates; the lungs are oppressed, and sobs and sighings follow; his strength fails him; his whole body trembles, or, as it sometimes happens, grows stiff like a statue; and his voice cleaves to the roof of his mouth. For which reason, Homer calls fear cold, and again speaks of pale fear; thus when Paris fled from Menelaus, trembling seized his limbs, he fell backwards, and his cheeks turned pale.

In that passage of the second book of the Æneid wherein Æneas is described as meeting the "mournful ghost or shade of his beloved Creüsa," while wandering through the burning ruins of Troy, we find the following expressive line, describing the effects of fear:—

"Obstupui, steteruntque comæ, et vox faucibus hæsit."

If we reflect on the variety of changes and actions

that must take place in our moral and physical constitution before either the *blush* of shame, or the *paleness* of fear, can be represented in the human face, we must clearly see that such adaptation and harmony of arrangement as here evinced, could never be the effect of *chance;* on the contrary, in every link of the chain which combines all the organs engaged in the production of these phenomena, there is a palpable evidence of *Design*, it is another convincing argument proclaiming to the hearts of men that "*the hand that made them is Divine.*"

Is it not interesting to analyze this *moral* passion, alluded to from the earliest times down to the present, in almost every novel, ballad, and romance, but explained by no one? Is it not interesting to inquire into the mystery of the existence of such a check upon the conscience, which tells man that he must not deceive his neighbour?

Blushing in its *diseased* form is evidently the result of an over refined state of *sensibility*; I, therefore, think it advisable to offer some general observations on Sensation—commencing with Plants, in which division of organic nature this faculty is first observed, and passing from the vegetable kingdom through the various classes of the lower animals to man, in whom it is developed in the same ratio with his status in civilization.

ON SENSIBILITY.

CHAPTER II.

SENSIBILITY OF PLANTS.

In the vegetable kingdom we can find an abundance of poetic allusions to the subject under consideration, in the name, for instance, of the *Blush rose*, of the *Carnation*, *Rubens uva*, &c., and who is not familiar with the following beautiful lines—

> "Full many a flower is born to BLUSH unseen,
> And waste its fragrance on the desert air?"

But as we have no evidence of any process similar to inflammation existing in this kingdom, and as the grand distinction between plants and animals consists in the former being deprived of that *sensation attended with consciousness*, and voluntary motion which the latter possess in such a high degree, we cannot expect to find an external and figurative illustration of *mental* emotion in this division of organised beings, unless, indeed, we would have recourse to the Pythagorean philosophy.

However, that plants possess a peculiar *irritability* or *excitability*, which is somewhat analogous to *sensation* in animals, is admitted by all; and some go even farther than this, and endeavour to show that sensation in the proper acceptation of the word exists in vegetables.

The singular power of motion, when touched, for which the *sensitive* plant is so celebrated, has been frequently cited as the best example for proving the correctness of this statement. Even Dutrochet has attempted to show that the nervous particles in which sensation specially resides are visible to the naked eye. For example, in the *sensitive* plant, at a little swelling at the base of the leaf stalk, where the greatest degree of motion resides, these little green particles of supposed nervous matter are particularly abundant, and, what is extremely curious, these granules are found to be affected by certain chemical agents in the same manner as the nervous particles of certain molluscs. Poisons have been found by Professor Marcet of Geneva to act in the same way upon plants as upon animals, corrosive poisons stiffening the organs as if they produced a sort of vegetable inflammation, narcotic poisons relaxing the whole system, and inducing a state similar to stupefaction. Hence it has been concluded that there must be something analogous to the *scattered elements of a nervous system* in plants.

Brachet of Paris has endeavoured to prove that the pith is the seat of the nervous system in plants, and the medullary rays are the nervous branches. But De Candolle, the celebrated professor at Geneva, holds a different opinion from that entertained by MM. Mirbel, Brachet, Marcet, and Dutrochet. He, on the contrary, is of opinion that the analogy deduced from the animal kingdom in favour of sensation in plants is quite inconclusive.

The nervous system, says De Candolle, which is very evident and distinct from all others in animals of the upper classes, gradually tends to divide; and finally one is forced to admit, that in zoophytes the nervous matter is diffused over the whole body; so that the latter possess a kind of universal sensibility, without there being any where a nervous system distinct from the tissue. Hence, they say, we arrive at the vegetable kingdom, where the nervous system is incorporated with the whole tissue; but if this conclusion is to have any probability, it must be shown that the plants, which have the greatest resemblance to zoophytes in structure, are also those in which the symptoms of sensation are the most evident; but this is *not* the case.

Before concluding my remarks upon *sensation*, as observed or presumed to be observed in plants, I may give the following examples as the best general illustration of their sensibility. First, the Lettuce plant in flower, with which every one is familiar,

whose cuticle emits a milky fluid at the part touched or irritated. Second, the Barberry, which retreats instantaneously from the touch. Third, Venus's fly-trap, (Dionâea,) a native of Carolina, one of the best examples; if the surface of the upper side of the leaf of this plant be ever so gently touched, the sides will approximate, and the teeth will close up with such force that it is difficult to separate them again. Fourth, the Stylidium, a green-house plant, which is seen bending down to one side, as if it wished to conceal itself; but the moment it is touched, it suddenly starts up and swings to the opposite side. "The sensitive plant has its leaves divided into a great number of leaflets, which spread flat in the sunshine, and seem as quiet as other leaves; but only touch one of the leaflets, and the whole system of the leaf will be irritated; all the leaflets will rapidly collapse one after the other, till at last the impulse is communicated to the base of the leaf-stalk, which immediately curves downwards. After a time it rises again, the leaflets unfold, and the leaf resumes its original appearance and direction."

Whether this curious phenomenon be the effect of the vital principle merely in a state of concentrated action, as has been asserted, or, as I am inclined to believe, is a species of the same *sensation* with which animals are endowed, modified and adapted by Providence to the peculiar external agents under whose control the vegetable kingdom

is placed, and upon whom this entire family principally depends for existence. Whichever of these views of the subject be the correct one, I shall not now wait to discuss. It is sufficient for my present purpose to demonstrate that there is a something analogous to *sensation* (as we understand the term) inherent in this division of organic nature, that plants as well as animals are, to a greater or less degree, sensible of external impressions—that many of this tribe are capable of recoiling from these impressions, be it from an organic instinct or not, and if they are repeated, those examples above cited may be made to wither, droop, or die.

Is it "vital contractility" that causes the Daisy and Convolvulus to fold up their bosom as evening approaches? Is it from the same cause that the Hop plant follows the course of the sun from east to west, and even *dies* if forced into an opposite direction? Is it by this faculty also that the Sun-flower is enabled to present her splendid disk to the sun—

> "Sad when he sets, shuts up her yellow leaves,
> Drooping all night; and when he warm returns,
> Points her enamoured bosom to his ray?"

Is this "vegetable instinct?" is it "vital contractility?" or is it the *germ* of *true sensation?*

False Blushing, as before stated, being the effect of a morbid susceptibility of impressions in the sensorium, and liable to be excited by any mental emotion that may jar with its condition, I deemed it proper, and have endeavoured in the foregoing division of this Chapter, to demonstrate the first dawning of something akin to *sensation* * in the vegetable kingdom, and which, for the present, we shall suppose to be an inferior degree of that consciousness of impressions which is so characteristic of the highest orders of animate beings.

As we ascend in the scale of creation we find this endowment of consciousness gradually developed through each class of animals, until finally we arrive at man, in whom it is perfect. And how wonderfully is it graduated, in these various classes, according to the relations in which they stand to the external world !

In the functions of the simplest animals there is scarce any change from those of plants; and it is asserted that the class Infusoria, which has been placed by Muller at the ultimate limits of animal

* Thought seems to us somewhat strange ; but SENSATION is no less wonderful: a Divine power equally shows itself in the sensation of the meanest insect, as in Newton's brain ; and an eminent philosopher says, that sensation includes all our faculties.—VOLTAIRE.

existence, possesses even a less complicated structure than the perfect plants; but, nevertheless, it enjoys *sensation* in a higher degree than the former.

Advancing through the various classes of the Bursariæ, Polypi, Echinodermata, the highest order of Zoophytes, and considerably higher through the Articulatæ, Crustaceæ, &c.; we find the faculty of sensation to be ripening itself in each, according to the order in which they have been enumerated.

In the class of *birds*, the first division of animated nature in which genuine inflammation has been proved to exist, we find it highly developed; and lastly, in the Mammalia, at the head of which man is placed, in whom we find this function, or (more properly speaking) this *feeling*, attended with consciousness and perception, existing in the highest degree of refinement and perfection.

It is a law in physiology, that the *sensibility* and contractility of living and organized bodies are the primary causes of all the phenomena which such bodies exhibit. The subject of the present Essay comes within this law, for without sensibility and perception, blushing (in the moral sense of the word) could not be produced.

I have already traced sensation from its first appearance in the simple vegetable to its complete development in the human being; and as *sensibility* is, according to the above law, one of the principal causes of the phenomenon I am about to consider,

I shall make a few observations on this function individually, before entering into the particulars of our interesting subject.

SENSIBILITY OF MAN.

Nil est in intellectu, quod non prius fuerit in sensu.—ARISTOTLE.

Sensibility may be defined to be that peculiar action of the brain by which we receive impressions, either internal or external. The impression produced on any organ by the action of an external body constitutes sensation. This sensation being transmitted by nerves to the brain, is perceived, that is, *felt* by this organ. The sensation then becomes *perception*, and this first modification implies, as must be evident, the existence of a central organ, to which impressions produced on the senses are conveyed. Independent of those sensations that are carried from the organs of sense to the brain, there are others internal, that seem to be transmitted to it by a kind of sympathetic reaction, and these internal sensations are the origin of our moral faculties, according to M. Richerand and other physiologists.

In childhood and youth they are vivid, and easily excited; in manhood we find them still buoyant,

but more under the control of the will; thence, through life, they gradually decline, until they become finally confused or extinct in the fatuity of old age.

Since the time of Locke, it is allowed that our ideas come to us through the senses, and are not *innate*, as was formerly supposed. They are engendered by an association, as it were, of an external stimulus, and the mind; for instance, the emotions of pleasure or pain are connected with some external object, which, impinging upon the sensorium or thinking part of the brain, generate the ideas. Thus it is, if we receive pleasing or joyful tidings, our sensibility is roused, ideas are generated, and we feel an universal glow over the body. But, on the other hand, if the intelligence be painful, and the *feelings* intense, we feel oppressed; the heart, according to a popular expression, sinks within us, or weeping is produced by an emotion of sympathy.

This sense is modified by various causes, such as age, sex, temperament, the season, climate, habit, and individual disposition, and in civilized society we generally observe it in two perfectly distinct forms, *true* and *false*. In some persons it is very obtuse, in others it is very elevated, but the desideratum, or that necessary for the social state of existence, would be a medium between both these extremes.

By *true* sensibility, I mean that state of feeling

which draws a distinction between right and wrong, and is not liable to all impressions indiscriminately. It is this form of sensibility which impresses us with a moral consciousness of what *is* right, and that gives us strength of mind sufficient in the common occurrences of life, be they agreeable or otherwise, fully to perform our duty, without being thwarted by any mawkish sentiments, but at the same time evincing moral feeling when that feeling is properly called forth.

False sensibility is by far the most common of the two—it may be defined as a peculiar irritability of that part of the sensorium which receives the impression of our ideas—which is liable to be disturbed or excited by the slightest efforts of the imagination, and is as frequently affected by fanciful or imaginary as by real causes.

This morbid state, for such we must call it, as well as our vices and our virtues, is sometimes the effect of organisation, and sometimes the effect of education, or the want of it; but in all cases, the evil may be modified if not changed for the good, by timely well-directed moral training.

What is more common than to see a young person, or one who has not been in the habit of mixing in society, on entering a room appear abashed and confused, without the slightest cause whatsoever. Indeed, there are some individuals whom if you

only meet or chance to address, immediately become suffused—

Rubens instar rosæ;

and if they reply to you in turn, you find their answers are monosyllabic, vague, and incoherent. Now, let us see whence does this arise.

It is evidently from an unnatural or disordered state of the moral sensibility; but, as many circumstances may combine to encrease this derangement, as is observed in every-day life, I shall mention the following, as being in a general view the most leading: First, A mind naturally *sensitive*, if not guided or directed by rational means in youth, will invariably become easily excited if not irritable in after-years. Second, By harsh and improper correction for trivial errors, the mind of a young person, not endowed with false sensibility, may be rendered so, when introduced into society, from a constant fear of its own incapability or a dread of being convicted of some deficiency in the routine of manners, conversation, mode of expression, &c. Third, A mind educated by that sentimentalism or refinement which is the effect of novel reading, for, in this instance, the imagination generally leads the reason prisoner. This is an example of that *acquired* sensibility which unfits us for the duties of life, and is the individual's own fault, not that of the parent or guardian. As a general rule,

children and females are the most subject to this abnormal state of feeling, which it would appear emanates from the peculiar delicacy of their moral and physical organization; but this does not exempt individuals of the opposite sex from being similarly affected; on the contrary, we find numerous examples of young men equally sensitive, timid, and abashed in society; and how often do you see them blush deeply, if they are only asked a common-place question? This diseased sensibility frequently clings to the individual through life, and must be a drawback to a certain degree; such persons are constantly haunted with an idea of their own incapability, which in general may be attributed to the bad effects of early education.

CHAPTER III.

BLUSHING AN EVIDENCE OF DESIGN.

In Scripture history, in the books of Ezra and Nehemiah, both of whom were cotemporaries with Herodotus and Thucydides, the most ancient profane writers on record, we find Blushing referred to as an illustration of *shame*.

Is it not most probable that it was with this intention the Creator of man endowed him with this peculiar faculty of *exhibiting* his internal emotions, or more properly speaking, of the internal emotions exhibiting themselves, for no individual blushes voluntarily; it would, therefore, appear to serve as a check on the conscience, and prevent the moral faculties from being infringed upon, or deviating from their allotted path—

> " ——————— If there's a power above us,
> (And that there is, all Nature cries aloud
> Through all her works,) he must delight in virtue;
> And that which he delights in must be happy."

There are many whom corporeal punishment would not restrain from doing wrong; still the

dread of remorse, of shame, or of being made *blush* hereafter for past conduct, will serve as a moral restraint; in many cases it will control the individual from violating the laws of morality, and thus affords us a beautiful instance of the design, wisdom, and goodness of Providence.

In one of the works just mentioned, Ezra, in the consciousness of his guilt, exclaims, "O my God! I am ashamed, and *blush* to lift up my head to thee, my God: for our iniquities are great over our head, and our trespasses is grown up into heaven." In the only other instance in which the word is made use of in Scripture, as far as I am aware, it is intended to convey the same idea as the former, that is, to express *shame*.

The passage alluded is taken from the "Jews' judgment," in the book of Jeremiah, and runs thus:—"Nay, they were not at all ashamed, neither could they *blush*: therefore shall they fall amongst them that fall."

But, unfortunately, civilization or refinement seems to have perverted the original intent, if my hypothesis be correct; fornow it is difficult to judge whether the blush be from an impulse of shame, or merely from a sensibility that is over-wrought; and if my judgment does not err, it is much more frequently the effect of the latter than the former.

As I proceed with my investigation into the history and peculiarities of the various tribes of the

human species, I shall find abundance of evidence in favour of this assertion. We shall find that man, as he progresses from the savage state, in which he obeys or follows the dictates of nature, to that of civilization, wherein he observes the rules of art, advances *pari passu* in the vices of its refinement. Who ever heard of an American savage blushing from morbid sensibility? and yet is he on this account the less liable to the impulse of shame or disgrace, according to his own views or interpretations of such feelings? No! the change of colour in him is a genuine example of *moral instinct*—it is the result of a consciousness of guilt, and as such leads us to infer, that it was with this intent the blush was originally designed by our Maker.

This will appear at variance with one of Paley's doctrines, in which it is stated, that "there exists no *instinctive* moral sense, or if it does, it is not to be distinguished from habit."* Throughout this Essay I have endeavoured to show, that moral instinct, perfectly distinct from habit, does exist in man; and upon such a supposition I have founded some of my arguments.

* See Paley's Moral and Political Philosophy.

CHAPTER IV.

DIFFERENT VARIETIES OF THE HUMAN RACE.

BLUMENBACH has divided the human species into five varieties, as follows: the Caucasian, Mongolian, Ethiopian, American, and Malay; and as I shall have occasion, while following out the History of Blushing, to allude to the peculiarities of some of these varieties, I shall, for form's sake, adopt his classification.

Blumenbach regards the Caucasian as the primitive race, and in this variety he includes the Europeans (the natives of Lapland and Finland excepted). The inhabitants of Western Africa, the Georgians, Circassians, Armenians, inhabitants of the Caucasus; also the Turks, Persians, Arabians, the inhabitants of Northern Asia, &c.

This division of mankind he characterises as having a white skin, with a fair rosy tint, inclining to brown, red cheeks, hair black, brown, red, fair, &c.; irides dark in those with brown skin; light (blue, grey, or greenish) in the fair or rosy complexioned; moral feelings and intellectual powers most ener-

getic, and susceptible of the highest degree of development.

As the Mongolian, Armenian, and Malay varieties may be considered occupying an intermediate space between the Negro and European, it seems unnecessary to give their characteristics just now. For our present purpose, it will be sufficient to contrast the peculiarities of the Ethiopian with those of the European.

NEGRO'S PECULIARITY.

The greater part of the natives of Africa belong to this variety. The skin and eyes are black, the hair black and woolly, the skull compressed, with a low, narrow, and slanting forehead, the jaws projecting, prominent eyes, broad flat nose, and thick lips. These are a few of the striking peculiarities of the African's organization, which led Voltaire to suppose that they were a distinct species from all the rest, and induced Rousseau and his followers to describe the Negro and monkey as both belonging to the same species.

That the development of the intellectual faculties depends materially on the development and organization of the brain, is a fact admitted by all. We

need not therefore wonder why the Negro, the Hottentot, the Calmuc, and Carib, with their low, shelving foreheads, narrow temples, and large occiput, should be so much inferior in mental endowments to the European, whose organization we know to be by far more perfect. But that many of this tribe possess a natural goodness of heart, sense of honour, and warmth of disposition, is well known.

"The inferiority of the dark to the white races (says Mr. Lawrence) is much more general and strongly marked in the powers of knowledge and reflection, the intellectual faculties, using that expression in its most comprehensive sense, than in *moral feelings* and dispositions. Many of the former, although little civilized, display an openness of heart, a friendly and generous disposition, an observance of the point of honour, according to their own notions, from which nations more advanced in knowledge might often take a lesson with advantage."

Nothing is more erroneous than the common notion, that all Africans have one and the same character. Want of animation does not characterize them, and faces are often met with which express the various *emotions of the mind* with great energy, according to the experience of Dr. Winterbottom and others.

Indeed, we learn from the natural history of man, that every variety of his species in the known world

have their moments of joy, of sorrow, of hope, fear, pride, shame, &c., to a greater or less degree. The most barbarous of the human tribe, as well as the most polished and civilized, seem to be endowed, more or less, with the third of those vital functions peculiar to man, that is, the function of sensation or *feeling*, "which, operating on the encephalic nervous system, causes the elements of passions."

Thus, we find the dark Ethiopian moved or excited by those feelings, which are likewise common to the pallid Albino. The fiery-red spotted Indian displays the different shades of passion in an equal degree with his timid brethren, who lurk by the banks of the Missouri and Mississippi to the Gulf of Mexico; and the internal feelings attendant on such emotions, even in the most savage, are not unfrequently evinced by variation of colour in the cheek, lighter or deeper as it may happen, and as we shall presently see.

It is only, says Humboldt, in *white* men that the instantaneous penetration of the dermoidal system by the blood can take place; that slight change of the colour of the skin, which adds so powerful an expression to the emotion of the soul. "And how can those be trusted who know not how to blush? says the European, in his inveterate hatred to the Negro and the Indian." Both of these statements are much more plausible than correct; because the

increased redness peculiar to blushing is not observed in the negro's face, which nature seems to have screened by a dark veil—therefore, it has been taken for granted that he is incapable of blushing.

That such is not the case, we may infer from the following facts: First, That the dermoidal system *beneath* the colouring matter in the African's cheek is permeated by thousands of capillary blood-vessels, and that it is not inferior in its organization to that of the white, as we can prove by anatomical demonstration. Second, That it is more in the intellectual powers, as has been already stated, than in the *moral* faculties, that this variety of the human species is *inferior* to the European. Third, and most positive, That the Rete Mucosum, which is the seat of colour, is not re-produced after a breach of surface, and that the cicatrix in Blacks is therefore white. This is the generally received opinion.

I have frequently observed a Negress, a servant in a gentleman's family, who had one of these scars on the cheek, which invariably became *red* whenever she was abruptly spoken to, or charged with any trivial offence.

The redness proceeded from the circumference towards a perfectly defined margin, beyond which not a single red line passed. This fact was carefully observed, and seems interesting in a double

point of view, first, as tending to prove that the organization of a cicatrix proceeds from the circumference towards the centre, not from below upwards, as we may infer from the radiation of the blood, which did not pass through the centre, its organization not being as yet complete; and secondly, as affording convincing evidence that an African is not incapable of blushing, but that he, as well as the white, can give external evidence of the emotions of his mind, though in a less palpable manner than the latter.

Mr. Lawrence and Mr. Chevalier, in their lectures delivered at the London College of Surgeons, in illustration of some of the preparations of John Hunter's Museum, denied that the cicatrix in the Negro remains white; their assertion is right in one sense of the word, as time, by allowing the parts to become re-organized, produces a dark shade of colour, but never so dark as the original. I have never observed it darker than the areola seen round the nipple of a woman who has born children, and I have seen it of a yellowish white for years after it was perfectly formed.

When a true born Negro blushes, his cheeks become darker still than natural, and this may be accounted for in the following manner:—

When the blood rises as far as the Rete Mucosum, (which is naturally black in this variety,) in place of the redness becoming apparent, as it does

in the white, now from the dark veil placed before it, and through which it cannot pass, it only tends to render the surface of a deeper hue than before, for which purpose no colours are more adapted than black with a *red ground*, and M. Biett observes; "that the red tint which characterizes the exanthematous diseases" in the Caucasian variety "never exists in the Negro, in this case—on the contrary, the black tint is more evident than before."

I have seen the phenomenon of blushing occur in several of the *Hybrid* species, to the same degree nearly as in the European.

One individual in particular, a Mulatto, the off spring of a Negro and a white, whom I have frequently seen in this city, blushed as intensely as any European; she was apparently about twenty years of age, and the phenomenon was usually produced without any assignable cause whatever. It was interesting to observe the peculiar cast it gave her countenance, for as long as you spoke to her, blush followed blush in quick succession, chasing each other along the cheek, and one was no sooner faded than another begun. Thus giving convincing proof of the high-wrought sensibility of her feeling or imagination, and fully confuting the assertion of Humboldt, regarding the incapability of the "dark races" to give external evidence by blushing, of their deep internal feelings.

The differences between black and white men in

the texture of the Rete Mucosum or seat of colour, are distinctly noted by Blumenbach. He states, that "the native reddish-white of the cutis, the inner layer of the skin, shines through the transparent outer coverings in the white races, while in the dark the cutaneous pigment is seated in the Rete Mucosum; the epidermis, although pale, manifestly partaking of the same tint." This fully corroborates what I have said, as to the Negro becoming blacker when blushing than natural; for it seems very evident that when the intense red colour of the blood spreads itself beneath this dark pigment, peculiar to the African, it must render the shade deeper than it was originally.

There are many examples of the brown and yellow varieties belonging to the Mongolian, American, and Malay divisions, of the genus homo, in whom blushing has been noticed. Thus Forster states, that in the Otaheitan women, of a brownish cast, you may easily distinguish a spreading blush. And Dampier observes of the Tunquinese, who are of a tawny Indian hue, that you may perceive a blush or change of colour in many of their faces, on any sudden surprise or passion.

We have, also, instances recorded by Blumenbach and Winterbottom, of Mulattoes having red hair, freckled skin, and being capable of *varying* the colour of their cheek when excited.

ALBINO'S PECULIARITY.

The peculiarities of the Albinos, that singular description of the human race, are particularly worthy of our observation. These strange beings, though often born of Negro parents, are their very *antipodes*, if I may use the term, with regard to the colour of the skin, hair, eyes, &c. Their skin possesses an unnatural white shade or tint, their hair is milk-white, and the eyes are red or grey.

Blumenbach describes the iris as of a pale rose colour, and the pupil intensely red, exactly similar to those of ferrets and white rabbits. And Voltaire briefly states their peculiarities in the following words: "Leur blancheur n'est pas la nôtre; rien d'incarnat, nul mêlange de blanc et de brun, c'est une couleur de linge, ou plutôt de cire blanchie; leurs cheveux, leurs sourcils, sont de la plus belle et de la plus douce soie; leurs yeux ne ressemblent en rien à ceux des autres hommes, mais ils approchent beaucoup des yeux de perdrix."—*Essai sur les Mœurs, Introduction.*

The characters of the Albino, says Mr. Lawrence, in his interesting Lectures on Man, arise from a deficiency of the colouring principle, common to the skin, hair, and eyes of all other men. Thus the former has the hue which its cellular and vascular contexture produces; the hair is reduced to its

simple organic groundwork; and in the eyes, which are entirely destitute of pigmentum, the colour of the iris depends on the fine vessels which are so numerous in its composition, and that of the pupil on the still greater number of capillaries, which almost entirely form the choroid membrane. The state of the eyes is the principal source of inconvenience. The absence of the black pigment, which has the important office of absorbing superfluous portions of light, renders the eye preternaturally sensible of this stimulus. Even the glare of open day affects this organ painfully, hence the eyelids are closed; but they have superior power of vision in twilight, dusk, or imperfect darkness.

There are several examples recorded of European children having all the characteristic marks of the African Albino. When this occurs in the Caucasian division, it is generally looked upon as a disease, and is fancifully called *Albino Skin*—whereas, in reality, the European does not differ in any of his peculiarities from the African Albino; and we have sufficient evidence to show that this *Lusus Naturæ* is not exclusively confined to the Ethiopian variety; for individuals possessing the same leucœthiopic peculiarity and constitution, have been met with in various parts of the globe, from the North Pole to the Torrid Zone. They have been frequently seen by Dubois and Captain Cook, on the islands and shores of the Pacific, and amongst the Hindoo

races. There are, also, several European examples recorded by De Sausseure, Buzzi, Helvetius, Maupertius, and Dr. Traill.

The same delicacy of constitution that distinguishes the African is likewise common to the English Albino, as we may perceive from the following interesting account given by Dr. Traill, of one of the three he met with.

"The oldest of these Albinos is nine years of age; of a delicate constitution; slender, but well formed both in person and in features; his appetite has always been bad; he frequently complains of a dull pain in his forehead; his skin is exceedingly fair; his hair flaxen and soft; his cheeks have very little of the *rose* in them; the *iris* and *pupil* of his eyes are of a bright red colour, reflecting in some situations an opaline tinge; he cannot endure the light of the sun; when desired to look up, his eyelids are in constant motion, and he is incapable of fixing his eye steadily on any object, as is observed in those labouring under some kinds of slight ophthalmia, but in him is unaccompanied by tears. His mother says, that his tears never flow in the coldest weather; but when vexed or his feelings are hurt, they are shed abundantly. He goes to school, but generally retires to the darkest part of it to read his lesson; his disposition is very gentle, and he is not deficient in intellect."

It is singular that all the European Albinos re-

corded by these writers were of the male sex; and what is still more strange, the female offspring of the same families were entirely destitute of the Albino peculiarities of their brothers. However, I have seen an Albiness, in an obscure village of this country, born of white parents, having all the striking characteristics of her tropical brotherhood, and extremely sensitive; she appeared to be naturally timid and bashful, and her face became suffused with blood whenever her companions teazed or ridiculed her.

Some writers, Blumenbach, Winterbottom, &c., have endeavoured to prove that this class labour under a disease which they refer to the Cachexiæ, and consider it akin to leprosy. But, as far as my experience goes, I consider, with Mr. Lawrence, that these views are completely incorrect. "All their functions are executed as in other persons. They are born of healthy parents, occur among the robust and hardy members of savage tribes; and a similar deviation takes place in many wild animals —the rabbit, ferret, mouse, horse, &c."

The fact of Albinos being prone to blush, has not been mentioned by any of their historians; but I have observed it in other instances, besides that just related, and particularly in two individuals, a male and female, who were exhibited in Paris several years ago; they possessed all the common characteristics of their tribe, if it may be

so called, and I never witnessed a more interesting example of the manner in which the blush rises and overspreads the cheek than these individuals presented. Their sensibility was easily excited, and so deep felt was their emotion, when in any degree moved, that not only the cheeks, but the ears and neck, particularly around the *Thyroid gland*, became affected. The breast and *irides* also seemed to participate in the general sympathy. The natural dead whiteness of the skin enabled the observer to detect the slightest alteration in colour on the cheek from its original hue, and we could observe the blush rise to the surface in a small defined or circumscribed spot, not over the malar bone, like the purple hectic flush, but over the parotidean plexus of nerves, which contribute so materially to the expression of passion in the human face.

Thence it proceeded, diverging in radii to the circumference, until it formed almost a perfect circle.

There was an evident line of demarcation between the blush of the cheek and that of the neck and breast. In a word, one was not a continuation of the other, for the blood-red colour in both regions being the effect of the same impulse, was generated and rose to the surface simultaneously.

This does not appear to be the common progress of blushing; it is more frequently observed spreading from the circumference towards the centre, and not the reverse, as just stated, or rising equally over

every part of the cheek at the same moment. In this case, the surface round the Thyroid gland presented the same aspect precisely as the cheek. The ears appeared perfectly florid, and the irides naturally red in the Albino; in the present instance that redness *invariably increased* while blushing.

These individuals appeared to be unusually sensitive, for in the course of twenty minutes they blushed deeply several times. The slightest attempt to examine their peculiarities invariably excited this phenomenon.

It was extremely interesting to observe the various and alternating casts of expression which the rise and fall of colour produced in the countenances of these Albinos. At one time the cheek presented the appearance of a sheet of blood rising or spread upon a field of snow, and the next moment it assumed its original sickly white, or bloodless colour, as if it had never been permeated by any red vessels whatever. I was informed by their keeper that they were not Europeans, but Africans by birth, and had been at this time several years in Europe.

Will these facts not go some way in proving my assertion that the *dark* races have the power of exhibiting their feelings by blushing as well as the *white*. There is only a *negative* proof against this assertion, *i. e.*, the red colour being *invisible* in the former, and not in the latter. But as we have sufficient proof of a *white* Negro (Albino) being ca-

pable of blushing as intensely as any European, it is but fair to argue that a Gold Coast ebon-coloured African has the very same power.

In a subsequent part of this Essay, when treating of the tissues engaged in blushing, as the skin, capillary blood-vessels, cerebral and sympathetic nerves, &c., I may resume my inquiry into the peculiarities of this anomalous class of beings. In the mean time I shall endeavour to trace out the history of the phenomenon as far as the Caucasian variety of man is concerned, for in this division we are told that it is most highly developed; in short, that blushing is an exclusive privilege belonging to it—an inference which, as we have seen, is not perfectly inductive.

THE LIGHT-COLOURED RACES.

Blumenbach is inclined to believe that the primitive form of the human race was that which belongs to the Caucasian variety, of which the most beautiful specimens are now exhibited by the Georgians, Circassians, Turks, Greeks, and some Europeans.

The *greatest mental powers* have been bestowed on this variety, and they have discovered nearly all the arts and sciences; indeed, almost all our literature and knowledge has been derived from the same quarter. These nations have the most *intelligent* and *expressive* countenances, and the most beautiful

bodily proportions. They occupy the middle regions of the globe, while its extremities are filled by others.*

As we advance in civilization we find the human mind gradually progressing in the development of its moral and intellectual acquirements, and that at each step we advance, those faculties common to us with the brute, gradually disappear, and give place to the higher callings of the mind.

The *instinct* common to us in our early days of existence with the lower animals, and also predominant in man in the savage state, is replaced by *Reason.* Civilization develops this faculty which so exalts our species, which enables our conscience to discriminate between vice and virtue, which constantly urges us to obey its dictates; and what impulse can be more noble than that emanating from the dictates of reason?

The phenomenon I am endeavouring to illustrate is evidently an attendant upon Reason, and according as the latter is cultivated, so the former becomes developed.

In savage life *instinct* is more vigorous than reason; hence we cannot expect to find our subject so *frequently* illustrated in this tribe as in civilized beings, but as no one will deny that the savage possesses reason, therefore there is no evidence of his being *incapable* of blushing. This faculty, which elevates us above the rest of organic nature, lies dor-

* Lawrence's Lectures on Man.

mant or is wholly uncultivated in savage man, and where this is the case, its attributes, as a natural consequence, must remain undeveloped or unobserved.*

The Circassian women, who are so celebrated for their beauty, and so sought after by the keepers of the seraglios of Persia and Turkey, although not perfectly civilized, are occasionally seen to blush deeply, according to Lady M. Wortley Montague's account.

It is even considered an acquisition by the Sultan, as giving proof of their not being ultra barbarous, and those females who are thus capable of exhibiting their internal emotions, invariably bring a higher price than their less susceptible sisterhood.

In these people reason is to a certain degree cultivated—it predominates over instinct—conscience follows, and blushing is the natural result of both.

Advancing still nearer towards the centre of civilization, we perceive the mind and its faculties becoming highly developed. Reason now triumphantly exerts its influence over these faculties—the

* If there be any species of human beings not gifted with reason, it is, most assuredly, the wretched inhabitants of Carinthia and the Valais, known by the name of CRETINS, in whom their exists the lowest degree of mental debasement. They appear to have no other enjoyment than eating and sleeping; the swinish propensities are highly developed in them; and their insensibility is often so great that they will not even obey the calls of nature. There is little difference between these people and idiots.

intellectual endowments are exercised and refined, for the well being of social existence, and it is by this concentration of mental power, that civilized man feels his own superiority over the rest of creation.

But as we advance in reaping the advantages and virtues of civilization, we are not wholly exempt from the *vices of its refinement;* it is an overstraining of this refinement which oftentimes makes a vice of a virtue by perverting the original intent of nature.

In civilized society we find a variety of mental and bodily ailments which are unknown in savage life. Let us inquire whence does this arise? Is it the effect of climate, manners, mode of living, or is it an inherent quality of civilization itself? Why, the fact *per se* is sufficient to prove that the rules of *art*, the mainspring of civilization, cannot be indiscriminately obeyed without exerting a deleterious influence over the corporeal functions and intellectual faculties of man. For instance, we seldom hear of an Indian squaw dying in child-bed, or of her savage husband becoming mad about religion, politics, or any sudden reverse of fortune. No, these are a few of the taxes which we pay to civilization for the very numerous and invaluable gifts conferred upon us by means of the cultivation of the higher faculties.

It is a law in nature, that according as the mental or animal faculties are exercised, so are they developed, and that the offspring of indivi-

duals inherit more or less of the predominant qualities of their parents. In the civilized state the powers of the mind are chiefly cultivated, to the comparative extinction of the animal propensities, and according to the above law, the mind of a philosopher's child must be essentially different from the mind of one of savage, or even peasant parentage. It is true, that the same intuitive instinct which the lower animals also possess, is common to both during the period of their long infancy; but the difference lies in the still dormant faculties or propensities which both have inherited from their respective parents. To the parent of the one belongs vigour, and strength of body, that exerts to a certain degree a salutary influence over the mind, but to these must be added the full indulgence of unchecked animal passions, which must necessarily control that influence, and prevent it from having its due effect.

To the parent of the other belong all those sensations and feelings which intellectual refinement is capable of producing. Now, these faculties, as yet in embryo, mainly depend upon *early education*, both as to quantity and quality, for the character of their future development. The mind of the savage has little to lose from neglect on this score, as in his case it is the *physical* powers that are principally to be exercised in after life, and consequently from his cradle upwards every care is taken to inure him to all manner of hardships.

But it is very different with that of the civilized being. From the prospect of the status he is to hold in life, and the part he will have to perform in it in manhood, it is necessary that his mind, from the first dawning until it is capable of judging for itself, should be cultivated and trained in that path which may lead the nobler faculties to the highest state of intellectual development. His temperament and disposition are for the most part derived from one or other of his parents, whether sanguineous and bold, nervous and sensitive, or melancholic and timid. His sensorium is, by inheritance, extremely susceptible *of mental impressions, and as early* impressions are the most lasting, these which take deepest root in the mind, it becomes incumbent on the parent to exert his judgment and discrimination in the admission of all such to so sacred a sanctuary.

From the earliest infancy of a child, you can perceive the bent of his disposition, and whatever that may be, it will show itself by various indescribable ways. If it be quick and sensitive, you may easily observe the susceptibility of the mind, and the keenness with which certain impressions are felt; if you watch this child as he grows on towards manhood, you will perceive this sense of feeling gradually ripening itself, and if uneducated or unchecked by moral training in its early state, it becomes to a certain degree a mental disease, for in what other light can we look upon that state of

morbid sensibility which we daily meet with in social intercourse. It is this state which renders him timid of his own powers or capability, that prevents him from exercising properly those faculties with which nature may have endowed him, and of the possession of which he is perfectly conscious—still from a moral debility, and *inward* dread of failure, these intellectual powers, possessed by every rational being to a certain degree, are nipt in the bud, they bloom and die, as it were, in the same moment.

When such persons grow up and mingle in society, they soon perceive the baneful effects of their acute sensibility, they then endeavour to conquer it, when it has taken too firm a hold, and if their attempts are damped by failure, which not unfrequently happens, from that very dread of their own weakness just mentioned, they fall into the opposite extremes, as those of recklessness and libertinism.

It is this morbid state of feeling we see so frequently excite the *uncalled-for blush*, and which we must attribute to an irritability of the sensorium arising from an over refinement, and want of early moral education. In society there are a variety of causes that may excite a blush, as acute sensibility, shame, &c., for which reason it may be as well to classify them, and treat of each in the order of its arrangement.

CHAPTER V.

DIFFERENT VARIETIES OF THE BLUSH.

For the sake of simplicity I shall here adopt the arrangement observed in the Chapter on Sensibility, and merely divide the subject into two distinct species, True and False. Under the head of the True Blush we may place all those changes or variations in colour which take place on the cheek, having some good and substantial *moral cause* for their production, as an infringement upon the *feelings* by the recollection of some past *malheur* or disgrace, the convictions of conscience, &c. Under the head of the second or False Blush may be placed all those which have no other assignable cause for their production than that of an extreme state of morbid sensibility, over which reason and the moral powers seem to have no control whatever; for as I have already stated, no individual blushes of his own free will, as he knows it must place him, to a certain degree, in a painful position. I shall now make a few observations on the first division of blushing.

TRUE BLUSH.

In a former Chapter I have endeavoured to demonstrate an evidence of design in Providence, in the subject under consideration. I have there stated that the probable intent of the Creator, in endowing man with this peculiar property, was, that the soul might have sovereign power of displaying in the cheek, that part of the human body which is uncovered by all nations, the various internal emotions of the moral feelings whenever they are infringed upon either by accident or design, and that this precaution had the salutary effect of enabling our fellow-beings to know whenever we transgressed or violated those rules which should be held sacred, as being the bonds that unite man and man in the civilized state of social existence. Moreover, that our being conscious of this involuntary power which the soul possesses over the agents of our volition, might serve as a moral check upon the *inclination*, and to a certain degree prevent us from deviating from the prescribed rules of morality.

In this light, we must certainly admit the *utility*, and even the necessity of blushing in society, that is, of the true blush, which I am now considering; for when an individual consciously infringes upon the prescribed laws of society, he deserves to make at least a moral atonement for his culpable transgression.

Let us take a familiar example, in illustration of what has been defined the true blush. Suppose an individual, myself for instance, to have stolen or borrowed from other authors that which was their property, and by so doing, am enabled to acquire merit under false pretences, after some time my plagiarism is detected, I am then accused, by some kind critic, of my delinquency, and stripped of my borrowed plumes, still my inclination endeavours to conceal that which it is my duty to acknowledge. There is a rebellion excited by this infringement upon the laws of equity, between the will and the moral faculties, and if I am not dead to all sense of honour and shame, conscience triumphs, it rebukes me for my transgression, and as an atonement for the offence, *I blush deeply*, in the presence of my accusers. By this means the soul and conscience reflect upon the cheek the impression which has been made on them, and thus give convincing evidence, externally, of their own deep-felt emotion. Here I transgress, although perfectly conscious of doing wrong, and even of the probability of being afterwards detected, and consequently of the shame or disgrace which must follow. It is not morbid sensibility that produces the blush in this case; on the contrary, there is an evident and salutary cause for its appearance.

The following is another example of the blush of

conscience, as observed in a female in the state of "somnambulism."

I happened to be present at one of Baron Du Potet's exhibitions of Animal Magnetism, when there was a young lady manipulated on by M. le Baron, and after some five or ten minutes had elapsed from the commencement of the operation, this interesting young woman *apparently* resigned herself into the arms of Morpheus. We were informed by the Baron that she was now in a deep slumber, and dead to all external impressions. Some of the spectators appearing sceptical as to the truth of this assertion, the Baron, in order to convince them of its accuracy, pinched the girl's arm, and pricked it with pins in several places, to which she certainly appeared quite insensible; but it was remarked that a fly creeping on the cheek caused all the muscles of that side of the face to move. The Baron was then requested to give an explanation of this "mesmeric trance;" to which he replied, that the "science" was not far enough advanced as yet, to enable him to give a satisfactory explanation of the manner in which this wonderful effect was produced.

The girl still lying in the same state of apparent slumber, a discussion arose amongst the spectators, when one gentleman observed rather sharply, "that he had no doubt but the young lady herself could give a very satisfactory explanation of the mystery, if she wished." An intense blush, in which not only

the face, but the neck, chest, and ears of the magnetised lady were engaged, immediately succeeded this remark; it was a satisfactory answer to the gentleman's charge of deception on the girl's part, and needs no further comment. It is another striking illustration of the soul and conscience being ever on the watch to side with truth and justice against the deceitfulness of the human heart.

There is another variety of the true blush produced by causes very different from those of the foregoing, and which I may call the blush of *feeling*. A few months since, I happened to be conversing with a professional gentleman about the different layers of the human skin, and the peculiarities in this respect of the Negro, Albino, and European. He invited me to his residence to see some lithograph drawings of the same, which he said were pretty good. I accordingly went, and he produced three very beautiful sets of drawings, exhibiting the different layers of the skin. I asked by whom were they executed; he replied that the first two sets were drawn by a very interesting lecturer on surgery, and his son, several years ago, both of whom were now dead. I observed that he omitted mentioning the artist of the third set, which was certainly the best of the three, and jokingly said, "these were done by yourself, I presume, Mr.——" "Oh no," he replied, with a forced smile, "they were done by *my* son, who, poor fellow, is also dead."

A deep and burning blush followed these words, which came and went several times before his emotion seemed to subside.

This gentleman was upwards of sixty years of age, and although time had done his external work effectually by whitening the hair and furrowing the cheek; still the internal feelings seemed as keen and susceptible as if endowed with all the buoyancy of youth.

Here the irrepressible blush revealed the hidden anguish of the bereaved parent, and clearly demonstrates the impossibility of the *will* ever being able to overcome or control the *genuine* emotions of the *Soul.*

There is an intimate relationship between this form of blushing and lachrymation, or the shedding of tears, produced by sorrow. Both are the emotions of sympathy arising from very nearly the same cause, and according to the popular notion, give internal relief by lightening the burthen which oppresses the heart.

If the stimulus which produced the blush in the case just related, was *continued*—the memory still holding the image, in vivid colours, before the sensorium, a train of ideas would be engendered, recalling the past more vividly, and retaining its impression in the imagination. The mind becomes worked upon—there is a confliction amongst its feelings—the blush deepens, and finally the tears

are produced in more or less abundance, according to the intensity of the mental paroxysm.

I shall add one more illustration of the blush of feeling, as evinced by a French lady far advanced in years. She was a woman of keen sensibility, and highly cultivated mind; but from reverse of fortune was compelled to descend from her former station in life, to live in obscurity and not unfrequently in want. I heard her relate the history of her career one evening before a few friends. She attempted to assume a sort of hardened indifference to her vicissitudes of fortune; but, notwithstanding the wrinkles of age being stamped upon her brow, and her hair silvered by time, her feeling seemed as acute as it might have been in her earliest years, for ever and anon we could see the *flash* of the *soul's emotion* bursting through her cheek, with its most powerful expression, whenever she touched upon any part of her history tending to form a contrast between her present and past station in the world. The colour rose and fell upon her cheek in exact harmony with the light and pathetic passages of her narrative, and with the same intensity as is observable in youth.

Perhaps it will be expected that the blush of modesty or bashfulness, so frequently observed in the young people of both sexes, when first brought into society, should come under this head; but such an arrangement would not be in accordance with

my views. It may, indeed, be very interesting to see a young lady in a drawing room blushing for some trivial cause, as the blush invariably heightens the charms of beauty; and as it is, in this instance, considered to be a test of purity and innocence, many fond parents will, perhaps, coincide with the Sultan's ideas respecting the fair Circassians, and think it rather an acquisition than otherwise in their daughters; but I am of opinion that a blush is no test whatever of either purity or innocence, for many libertines and prostitutes may be seen to blush as deeply as individuals of the most exalted purity and virtue.

FALSE BLUSH.

If it was with the intent of giving evidence of those emotions of the mind, produced by *shame* or an *eruption of feeling*, that we were endowed by Providence with the power of blushing, we must necessarily consider all other instances in which this phenomenon is produced, as an example of what I define to be the False or Deceptive Blush. In all cases it emanates from that state of morbid sensibility which I have treated of in a former Chapter of this Essay, and the remarks that have

been there made, will be found likewise applicable to this form of blushing.

This part of our subject is fertile in examples; old and young, male and female, bear ample testimony to the accuracy of my statement. It may be observed in all grades and stations of civilized beings, from the first dawning of reason till its extinction in old age; it is hereditary, it pervades entire families; it restrains some, it infuriates others, at being thus made subordinate to the mental feelings, and wherever it once takes root, like the Old Man of the Sea, it clings to the individual through life with a resolute and imperishable grasp. In childhood we never blush, for then we are merely animals of instinct, the same as in the fatuity of old age. In the former the reasoning powers have not as yet developed themselves, in the latter they have passed away. In both conditions we are dead to the moral and intellectual world, and should a glimmering of either of these powers exhibit itself in the morning of our existence, it must be attributed solely to that docile instinct which is common to us with the lower animals, which renders a dog sagacious, and enables *him* to judge between right and wrong.

What more striking illustration of the foregoing can we have than the fact, that the same exhibition (a human execution) which yields so much pleasure and amusement to a child, will cause the nurse who

bears it in her arms to give evidence of her internal emotion by weeping or fainting away, and perhaps this same child, in a few years afterwards, cannot look upon a similar exhibition without following the example of its nurse. This clearly proves my former assertion, that the blush is evidently a result of reason, and cannot take place without its impulse, else why is the congenital *idiot incapable* of exhibiting this phenomenon? he can weep, sigh, and laugh, all of which may be represented in the inferior animals, and consequently do not require the impulse of reason for their production; but he has never been seen to blush, his defective organization preventing him from enjoying any other than a vegetative existence.

This habit of blushing from morbid sensibility is as common with young men as with young women, and although it is considered a beauty in the latter instance, we cannot view it in any other light than as a disease, when it frequently occurs in *men* who have arrived at the years of maturity. In this case the bane of it is deeply felt by those who are under its influence, and notwithstanding its *poesied* beauty, seems to be looked upon as a drawback in *male* society, tending materially to curb the natural impulse of the individual.

There are peculiar constitutions more prone to blush than others, and it will be found as a general

rule, that individuals of a sanguine temperament are much more subject to this disorder than those of a lymphatic or melancholic constitution. The eloquent Richerand gives the following graphic description of the sanguineous temperament.

"If the heart and vessels which carry the red blood through every part, are of predominant activity, the pulse will be sharp, frequent, and regular—the complexion ruddy, the countenance animated, the shape good, the forms softened though distinct, the flesh of tolerable consistence, moderate plumpness, the hair fair, and inclining to chesnut; the nervous susceptibility will be lively, and attended with rapid *susceptibility*, that is to say, that being easily affected by the impressions of outward objects, men of this temperament will pass rapidly from one idea to another; conception will be quick, memory prompt, the imagination lively; they will be addicted to the pleasures of the table and of *love*; will enjoy a health seldom interrupted by disease; and all their diseases, and these slight, modified by the temperament, will have their seat principally in the *circulatory system*." "Inconstancy and levity are, in fact, the chief attributes of men of this temperament; excessive variety appears to be to them a necessity as much as an enjoyment; good, generous, *feeling*, quick, impassioned, delicate in love, but fickle; disgust in them follows close upon enjoyment; meditating desertion in the midst of

the most intoxicating caresses, they make their escape from beauty, at the very moment she thought to have bound them by indissoluble chains. In vain he whom nature has endowed with a sanguine temperament, will think to renounce the pleasures of the senses, to take fixed and lasting likings, to attain, by profound meditation, to the most abstract truths; mastered by his physical dispositions, he will be for ever driven back to the pleasures from which he flies, to the inconstancy which is his lot; more fitted to the brilliant productions of wit (as Voltaire) than the sublime conceptions of genius (as Newton, who was of a lymphatic constitution). His blood, which a vast lung impregnates plentifully with atmospherical oxygen, flows freely in very *dilatable canals*, and this facility in the distribution and course of the humours is, at once, the cause and the image of the happy dispositions of his mind. However, the History of Henry IV., of Louis XIV., of Regnard, and of Mirabeau proves that, to the extreme love of pleasure, sanguine men join, when circumstances require it, great elevation of thought and character; and can bring into action the highest talents in every department."

Individuals of a consumptive or scrofulous habit are also particularly prone to blushing. Their smooth transparent skin, fair hair, and rosy complexion, denotes the delicacy of their organization,

and their great susceptibility of both external and internal impressions.

There is a mental character (says Dr. Macartney) belonging to the *scrofulous* habit, which more strikingly indicates the peculiar state of the constitution than all other signs. Scrofulous persons in general exhibit no mental energy, but a gentleness and amiability of disposition, a refinement and judgment in matters of taste, and a purity of *moral feeling*, which is sometimes so remarkable as to place them, in these points, far beyond the scale, and even beyond the conception, of the mass of mankind. In these the vascular system is weak, the vessels are small, the blood is deficient in quantity, and is, I think, imperfectly organized.

Dr. Macartney has thus beautifully described the mental character of the scrofulous individual, and this description applies equally to the generality of those persons who become victims to consumption at an early age. The transient flushes to which individuals of this habit are so subject is not owing to a redundancy of blood in the system; on the contrary, it is a striking evidence of the weakness and frailty of the constitution, and its diseased susceptibility of every impression whatever.

Persons of red hair and florid skin are extremely subject to this peculiarity, but these should come, properly speaking, under the head of "Sanguineous Temperament."

I knew a family (including father and mother) who were particularly liable to blushing, with one single exception, the second son, aged eighteen, who was labouring under *Cyanosis*, or the *Blue Disease*, of which he ultimately died.

It was curious to observe this individual when at all agitated, to which he seemed equally susceptible with the rest of the family; his cheeks, instead of becoming red, assumed a deeper or more purple hue than before, so that in reality he evinced his feelings by an alternation of colour on the cheek, although it could not, strictly speaking, be called a *blush*. Were I permitted to use the term "blue, or violet blush," then I might express my meaning more clearly. However, the fact proves, that the *sedative* influence of the carbonised or un-æreated blood did not retard this fluid from responding to the mental emotions, and although it is supposed that persons affected with Cyanosis in some respects resemble *cold-blooded* animals, this shows that they are also capable of evincing internal feeling as well as any other of their fellow-beings.

THE DECEPTIVE BLUSH.

Its reference to Medical Jurisprudence.

Blushing, or any alteration in the colour of the cheek, from its natural state, should not be *indiscriminately* considered as an evidence of guilt. Nothing could be more delusive or erroneous than such a supposition, especially without taking into consideration the general *aspect* of the *features*, and the marked difference always observable in them between the blush of conscience, and that of weakness or irritability.

In a foregoing page, I have shown that there are many individuals who change colour without any apparent cause whatever, it being merely the effect of *inordinate sensibility*, therefore, were we to judge of its being in such instances the result of an infringement upon the moral or social laws, it would be extremely culpable, and would display a total ignorance of the laws of human nature. Yet, how frequently do we hear learned counsel at the bar, by strong language, endeavouring to excite the feelings of the accused; should any variation in colour take place, (and how often do the *innocent* turn pale or become suffused, from the mere dread of the accusation,) the eloquent declaimer proceeds, exulting in

the plenitude of his oral power, and the effect it may have produced, to direct the attention of the presiding judge and jury to the varying countenance of the excited and agitated prisoner; still vehemently appealing to their judgment, if the fluctuating colour, and trembling aspect of the face, was not an illustration of remorse of conscience, and convincing evidence of the culprit's guilt.

The man who thus takes advantage of the weakness of human nature, must be guilty of either of two charges; first, that of being ignorant of the manner by which the mind can be affected, under certain circumstances, and that some individuals are so constituted as to be more susceptible of impressions than others, so that the innocent may often appear the guilty; and secondly, though conscious of the foregoing, nevertheless, to gain his point, he converts the knowledge of this fact to his own purposes, and endeavours by harrowing up the feelings to intimidate and criminate the innocent.

If guilty of the former, it is to be regretted that he who studies human law, and makes that his profession, does not blend with it a knowledge of the laws of his Divine Maker, as evinced in moral and physical man; and if the latter be true, we have another melancholy example of the depravity of human nature, which leads an individual to endeavour to prove the innocent guilty, merely because he is paid to do so.

Such a state of things is not much better than the barbarous custom of former ages, when the *supposed* murderer was made to touch the body of the deceased in open court, before the gaze of hundreds, and upon the result of this experiment depended the life or death of the prisoner. From the foregoing I conclude, that an alteration of colour upon the cheek, either in public or private society, should not always be regarded as criminating the individual concerned; in some instances it may do so, but the knowledge that the blush may be as frequently deceptive, from idiosyncrasy, &c. warrants our charitable maxim to *acquit* the *guilty* rather than condemn the *innocent*.

THE HECTIC FLUSH AND FLUSH OF RAGE.

Their difference from the True Blush, in which the Countenance droops.

HECTIC FLUSH.

Any individual at all observant can readily recognize the peculiar flush of the consumptive—the colour is not diffused over the cheek as in ordinary instances, it is generally confined to a certain spot, and this purple patch situated over the malar bone,

with the delicately pale halo that surrounds it, is looked upon by the physician as the harbinger of approaching death.

The hectic flush is the result of an effort of *organic instinct*, and not of mental emotion; it comes and goes momentarily, without the mind being at all affected; it is, perhaps, what Cullen might have called an illustration of the "Vis Medicatrix Naturæ," and beautifully demonstrates the instinctive properties of organic nature. In these instances the aspect of the features does not become changed; the countenance retains, with the exception of the change of colour in the cheek, its natural appearance or expression, so different from what takes place in blushing from a sensorial impulse.

Every one engaged in the pursuit of medicine must have frequently observed this scintillating hectic flush, presaging death to its unhappy victim, and invariably burning brightest (like the light of an expiring taper) as it draws nearer to its close; and who that has ever seen the consumptive but knows they are generally the brightest and fairest specimens of *creation*.

If there be one of a family more engaging or more blessed by nature than the rest, this is the individual that is sure to die. There is a gentleness and refinement in all his actions, in all his sayings, and in all his movements, that wins you to his friendship. You feel proud of the intimacy of

one who seems perfect—you gather all that falls from his lips, and treasure it in your bosom—you feel as if you knew the world, but till now knew it on its dark side only—a new existence seems to dawn upon you, emanating from the society of one who appears to be all that is pure and exalted.

There is an ease and chastity in his every expression, that magnifies his worth tenfold in your estimation. The theories of the degeneration of mankind fade from your memory, and you agree with the philosopher, "that man thinks in the past a perfection which never did exist." Day by day passes on; there is a spirituality in your ideas, that has entered there as if by imbibition, and you feel cleansed from those that were foul and gross in nature. At length you observe a pallidness of countenance in your friend, but this you ascribe to the *cast of thought;* it grows on gradually until it assumes a sort of transparency, "splendidior vitro;" the teeth partake of the same hue, the nails incurvate, and the veins look blue and shadowy.

A small *circumscribed* blush at length rises on the cheek, (the insidious forerunner of death,) and completes this beautiful and melancholy picture. An illustration of his soul is to be seen in the purity and serenity of his countenance—he is perfectly unconscious of his approaching end, and of the heart-rending sorrow his state entails on his friends and relatives, perhaps planning some new excur-

sion only a few hours before death itself takes place. The blush, still the same sleeping and waking, presides over him with miser care. The heart-broken mother steals to his bedside while asleep—she sees her beloved son *blooming* on the verge of death—a death that she knows to be inevitable—she hears him breathe still tranquilly, yet she dare not hope —she looks again upon the child of her bosom—

> " As still he lay, and on his thin-worn cheek
> A PURPLE HECTIC play'd, like dying day
> On the snow tops of distant hills ; ——"

There is a stillness around, which has a semblance to the hush of death—the unhappy parent seizes a mirror and holds it to the lips of her child—but, alas ! the last life-drop has passed on to eternity—all that was mortal having breathed itself away in one soft melancholy sigh.

FLUSH OF RAGE.

The flush of *Rage* is as familiar to all as the blush of shame, and although the variation of colour is nearly the same in both cases, still the feelings by which this change is excited are, as every one knows, directly opposed to each other. In the former the crimson hue of the cheek is the effect of

an *animal* passion; in the latter it is solely the result of a *moral* or *spiritual* impulse. The grand distinction between these phenomena does not consist in any peculiarity of colour, but in the marked difference visible in the expression of the countenance during the paroxysm.

Every one is familiar with the piercing, fire-flashing eye of the *enraged*, in whom each feature is sharpened to acuteness. This has been observed by the earliest writers, and we find some of Homer's finest characters "flushed with rage," "their eyes glistening with fire," and eager for revenge. Thus he compares the eyes of Agamemnon, when enraged, to a flame.* When Achilles was angry because his mistress was taken from him, "his eyes shone terribly;" and when Ajax persuades him to take arms again, he exclaims, "My heart swells with rage."† And when he saw his arms brought him by Thetis, "presently his heart glows with rage, and flames of fire flashed from his eyeballs."‡ The above illustrations of our subject are taken from the immortal poet who has copied so rigidly from nature; and we find our own Homer, the bard of Avon, revelling in the fitful passions of a Richard and a Macbeth. When we contrast with these the drooping or downcast aspect of the entire countenance in the blush of guilt, the features, as it

* Iliad, lib. i. † Ib. lib. ix. ‡ Ib. lib. x.

were, for the moment assuming an indescribable expression of languor, we may readily detect the leading characteristics of both phenomena.

In the blush of shame every feature seems in a state of collapse. They gradually sink, one by one, from their natural position. We may first observe the eyebrows, if arched or elevated, sinking to a plane. The upper eyelid and cilia follow, drooping over the eyeball, which now begins to appear dim, and this organ itself is seen turning towards the earth, whither it is impelled by the consciousness of its subjugation, but more especially to avoid the scrutinizing gaze of the spectator. In this state the individual remains until the paroxysm has passed away, but sometimes blush follows blush, if the excitement and susceptibility correspond in intensity. As the feelings subside, the features resume their wonted aspect. That eye which but a moment before

"Downcast drooped in tearless agony,"

gradually assumes its natural brilliancy and expression, and the whole countenance, "the mirror of the soul," is once more calm and composed, after having told "the tale of its prison-house."

CHAPTER VI.

THE IDIOT'S PECULIARITY.

The congenital idiot is capable of exhibiting all the *instinctive* passions in a high degree, but as far as I am aware, he never evinces his sensorial feelings by Blushing. Query—Why does this being never blush? is he incapable of the act?

In a foregoing Chapter I have endeavoured to show that the phenomenon of blushing is an impulse of the *reasoning* power; and if this be true, we must necessarily infer, that individuals deprived of this ennobling faculty are wholly incapable of exhibiting the phenomenon in question. Therefore, idiots come under this rule in particular.

In the paralyzation of reason, consequent upon inebriation from wine or opium, we have an example of man in his *healthy* state exhibiting the characters of an irrational being. During the period of intoxication, his sensorium is dead to all moral impressions—reason is dormant for the time being,

and he is perfectly insensible to the different feelings of honour, shame, disgrace, &c.; although, in his sober moments, he may have been keenly alive to these emotions, and if so, will again experience them in their full power, when reason resumes her empire.*

Insane persons, being subject to lucid intervals occasionally, and then exhibiting the powers of reason, do not strictly belong to the same class of irrational beings. The loss of reason in the idiot is permanent from the cradle to the grave; in the maniac it frequently comes and goes as if from whim or caprice.†

But, it is worthy of observation that individuals having a tendency to insanity are particularly subject to colouring; indeed, the wild rolling eye and flushing cheek are almost invariably observed amongst the first symptoms of this dreadful disease.

The idiot is capable of weeping, laughing, &c.—he is particularly subject to become enraged—the animal propensities are highly developed in him—in short, he is the slave of the instinctive passions; and, therefore, he should be regarded as an animal of the neutral ground, being lower in the scale of creation than rational man, and not much above the brute.

* See Darwin's Zoonomia, Article—Drunkenness.

† Some German writers go so far as to regard all insanity as a wrong action of the soul, and speak of the insane as sinners. —Dr. Baly.

Professor Muller, in his profound work on Physiology, states his opinion that idiocy depends upon an imperfect formation of the brain, and is not a *congenital* disease of the *mind.* In illustration of this he gives the cases of two congenital idiots residing near Bromberg, in Germany.

One of these individuals is seventeen, the other ten years of age. Both enjoying excellent health, are at the same time so stupid that they do not remember their way back to their home if they leave it but a short distance; they manifest their volition only in eating and drinking, and in destroying everything which comes into their hands; they are, however, tractable and harmless in disposition. Even in these remarkable cases (adds Professor Muller) we cannot imagine that any congenital disease of the mind itself existed, *any original defect in the mental principle;* in the latent state of this principle *in the germ*, there was, without doubt, all present which was necessary for the highest perfection, but on account of the imperfect formation of the brain, the development of the *higher mental faculties* became *impossible.*

The idiot is in general happy, but his happiness emanates wholly from animal or instinctive enjoyment; being isolated from his fellow-beings by the deprivation of the moral and intellectual powers, he is totally unconscious of the difference between right and wrong—his life is a long infancy of

vegetative existence, born and dying in the same state of unconsciousness.

The idiot cannot blush; the primum mobile of action, (*i. e.* conscience,) in all cases of infringement upon moral rectitude, is dormant in this being. From these and similar facts it is but reasonable to infer that the *seat* of the impulse which excites the true blush is *higher up* in the nervous system than that of the PASSIONS—or, in other words, that this impulse emanates wholly from the *cerebrum*.

ANALOGOUS PHENOMENA IN THE LOWER ANIMALS.

If we regard the sudden colouring of the cheek from passion in the same light as other instances of "vital turgescence" produced by different means, we shall find a beautiful illustration of the phenomenon of *flushing* in the comb of the turkey and game-cock when inflamed or enraged. In this instance, as in man, the sudden flush is evidently the effect of an impulse of the mind; in both cases it gives external evidence of strong internal emotion.

In some of our domestic quadrupeds, as the *dog*, for instance, we are aware that consciousness, or rather an *instinctive conscience*, exists to a certain degree.

This animal knows well the distinction between right and wrong, and is always aware when he has transgressed. If a dog be chastised for his offence, he evinces *shame* in his *own peculiar* manner. This is alluded to, in "The Life of Sir Walter Scott," in the following passage: "Sir Walter amused himself with the peculiarities of another of his dogs, a little *shame-faced* terrier, with large glassy eyes, one of the most sensitive little bodies to insult and indignity in the world. If ever he whipped him, he said the little fellow would sneak off and hide himself from the light of day in a lumber garret, whence there was no drawing him forth but by the sound of the chopping knife, as if chopping his victuals, when he would steal forth with *humiliated aspect* and *downcast look*, but would skulk away again if any one regarded him." This is not an uncommon occurrence, or confined to any particular species; it may, on the contrary, be frequently observed. Birds generally evince their passion by the expression of the eye and curling of their plumage. Thus in the parrot, when enraged, the *membrana nictitans** may be observed expanding over the globe of the eye, leaving but a small aperture for vision.

Although I cannot illustrate this part of my sub-

* By means of this THIRD eyelid, according to CUVIER, the Eagle is enabled to look at the sun. The IRIS may also be seen contracting in the Parrot when roused by anger.

ject by an example derived from the vegetable kingdom, still there are a few interesting points relative to the *colouring of plants*, which may not be altogether inadmissible in this place.

In another part of this Essay, I have alluded to the state of "turgor vitalis," or vital turgescence, being suddenly excited in some plants, as exemplified in the turgid state of the leaf-bud from the sudden ascent of the sap, which may be produced artifically in particular cases. This is often the effect of "*sensibility*," or "excitability;" but I fear we cannot explain the sudden *change of colour* so frequently observed in flowers, on the same principle. Thus a dingy brownish-purple tulip will suddenly, and without warning, burst forth in the most radiant beauty, its dull disagreeable colours dispersed, a pure and spotless white taking its place in part, and the brightest and *deepest streaks* of *crimson* adding richness to its purity. It is singular, that amongst the natural colours of plants, *red* is very common, and yellow, blue, pale, &c. comparatively rare. The different colours of flowers depends principally upon solar light, and the various degrees of oxygenation of their *chromule* or colouring matter, unless in some particular instances, where they may be determined by the presence of an acid or an alkali.

Were it advisable to extend this notice of the

colouring of flowers further, the kingdom of Flora would afford an ample store of interesting illustrations for our purpose; but as a more lengthened enquiry (however pleasing the subject might be in itself) into the beauties and mysteries of this division of creation could not, with propriety, be given in these pages, I shall here draw the First Division of my subject to a close.

SECTION SECOND.

THE ANATOMY OF BLUSHING.

CHAPTER I.

THE BRAIN, SPINAL MARROW, AND SYMPATHETIC NERVES.

In the first part of this Essay I have endeavoured to trace out the history of Blushing, and have there attempted to show that in its healthy state this phenomenon emanates from the impulse of moral rectitude, and in its diseased form is entirely the effect of morbid sensibility. I have traced that sensibility from its first appearance in animate beings to its perfect development and over-refinement in civilized man. I have theorized on the probable intent of Providence in endowing our kind with this peculiar involuntary power. I have shown that it is a beautiful illustration of moral instinct and design, and by inductive reasoning have endeavoured to prove that the Creator, who ordains everything in nature to fulfil his own wise and good purposes, has endowed

man with this *guardian* faculty, for the sole purpose of giving external evidence of his intense *feelings*, and consciousness of *shame*. I have traced its appearance in some of the different coloured varieties of the human race, and have seen that it is less frequent in *savage* than in civilized existence. Not agreeing with our forefathers in the existence of a black-blooded race of men, I have demonstrated that the dark Ethiopian is as capable of exhibiting this phenomenon, as the beautiful Circassian or fair European ; and as we advanced in the scale of civilization we observed that its appearance became more frequent at every step. I have pointed out its intimate connection with moral philosophy, practical education, and medical jurisprudence, and to these important points the greater portion of the first part of this Essay has been devoted.

I have now arrived at the second part of my inquiries, which I trust will appear still more interesting than the first; for as simple and common-place as the act of blushing may appear to the general observer, we shall see that there are a multitude of actions and parts to be performed by our mental and physical faculties before it can be produced. I shall endeavour to demonstrate in this Section, that there are a variety of parts to be engaged; that there is a chain of action to be set up between the sensorium and the heart, the minute blood-vessels

and the nerves, (sympathetic, spinal, and cerebral,) before the slightest blush can be produced. I shall, likewise, endeavour to point out the wonderful harmony by which all these corporeal and intellectual functions are combined and propelled, and made effectual to the production of this single result.

The principal structures *directly* engaged in the production of this phenomenon are: First, The brain, spinal marrow, involuntary nervous system, &c., with which the heart, stomach, and lungs seem to sympathize. Second, The minute arteries and capillary blood-vessels of the cheek, &c. Third, The skin in man, and the erectile tissues in the lower animals; but as we shall see hereafter, this latter structure may be engaged in the human being during the act of blushing; and in addition to the foregoing, I may here observe, that the conjunctivæ of the eyes not unfrequently become injected with red blood, when the mental paroxysm becomes intense.

Having thus premised, let me now endeavour to investigate and unravel these different structures, individually, and in the order of their arrangement; but it is to be understood, that I only intend to treat of each as far as it has any reference or connection with the present subject.

OF THE BRAIN.

Of all animals, man has the most capacious skull in proportion to his face; and as the size of the brain is always in proportion to that of the osseous case which contains it, the brain is also most bulky in man. This difference of size between the cranium and face may be taken as the measure of the human understanding, and of the instinct of the lower animals. The stupidity and ferocity of the latter are greater according as the proportions of these two parts of their skull vary from those of the human head. From the brain the nerves are propagated to the various organs of the senses, and over the body, bestowing sensation, and acting as the agents of the will. It is the receptacle of sensation, and believed to be the instrument of thought, and it was formerly supposed that the *soul* existed in a small body called the pineal gland, situated near the centre of this organ.* The substance of the brain is delicate and soft, and possesses a degree of elastic resistance. It is protected and supported by the skull and dura mater; its peculiar matter is supported and nourished by the pia mater. It also consists of two very distinct substances, the cineritious and medullary matter, and the vessels which

* Descartes.

supply it with blood, are branches of the carotid and vertebral arteries. According to M. Magendie the brain is the *material* organ of thought, which he says is proved by a number of *experiments* and facts, and that nothing is more complicated or more difficult in anatomy than the study of its organization. Vauquelin has analyzed the brain, and has come to the conclusion that in 100 parts there are 80 of water, 4.53 white fatty matter, 0.7 reddish fatty matter, 7 albumen, 1.12 ozmazome, 1.5 phosphorus, 5.15 acids, salts, and sulphur. In order to disclose the structure of the brain better than had been hitherto done, MM. Gall and Spurzheim began their dissection at its base, and proceeded upwards, contrary to the former mode of examining this organ, which was from above downwards, and have considerably advanced our knowledge respecting its functions and structure. We are, likewise, indebted to them for their ingenious system of Phrenology.

These anatomists have endeavoured to prove that there are thirty-five different faculties, all seated on the *surface* of the brain, and which may be *generally* known by eminences on the external table of the skull, corresponding to their situation. These thirty-five faculties are divided into two *orders*. The first includes those which come under the head of the *Feelings*; the second merely those of the *Understanding*. But this arrangement of the mental

powers, though ingenious in itself, was of too arbitrary a nature to admit of its ever being generally adopted.

It is, however, now universally admitted that the sensorium or thinking faculty has its seat in the brain, and that the latter organ must be in a healthy state in order that the powers of the mind may be duly and properly exercised. But the seat of the *Passions* has not been as yet so firmly agreed upon. The ancients supposed that they existed in the viscera, in consequence of every vivid sensation of joy or distress, of pleasure or pain, bringing on a feeling of anxiety in the præcordia. They placed courage in the heart, anger in the liver, joy in the spleen, &c. Bacon and Van Helmont seated them in the stomach, Lecat in the nervous plexuses; other physiologists in the ganglia of the great sympathetic, &c. But the majority of modern philosophers have considered the brain as the seat of the passions. Others again deny the accuracy of this assertion, and on this subject Magendie makes the following eloquent comment. Shall we speak of the seat of the passions? says this eminent physiologist. Shall we say, like Bichât, that they reside in organic life, or like the ancients and certain moderns, that anger resides in the head, courage in the heart, fear in the semilunar ganglion, &c.? But the passions are internal sensations; *they can have no seat.* They are the result of the action of

the nervous system, and particularly of that of the brain. They admit then of no explanation. They may be observed, directed, calmed, or extinguished, *but not explained.*

From whatever source the *passions* may have their origin, it is self-evident that the impulse which excites the blush wholly originates from the sensorium in the brain, for, as we have already observed, this phenomenon is closely allied to reason and understanding, both of which must co-exist before it can be fully developed. We might draw this line of distinction between blushing and the passions commonly so called, viz,. if the former be a *passion*, (as we understand that term,) it is evidently one of *reason*, in contradistinction to the others, or passions of instinct, such as joy, fear, pleasure, pain, &c. The latter are wholly instinctive ; they may be evinced by the lower animals, but for the production of the former there is conscience, understanding, and reason necessary, or in other words, it is solely and exclusively a prerogative of the *human* soul. From what has been stated regarding the sensorium and brain, it may be fairly induced that the latter organ is the primitive seat of the impulse which excites the blush ; that it is in this organ the ideas are generated—that the image of our real or imaginary transgression of the moral laws is formed, and kept before the soul, until it is fully charged with its impression, and rebels, when its involuntary nervous

allies, the spinal marrow and sympathetic nerves, sympathize with its disturbed functions.

OF THE SPINAL MARROW.

Until of late years little had been known regarding the physiology of this organ, or, indeed, I might add, of the entire nervous system. It is to the brilliant discoveries of Magendie, Sir Charles Bell, Professor Muller, Signor Bellingeri, and Marshall Hall, that we are principally indebted for all our knowledge regarding the structure and functions of these parts; but, to our illustrious countrymen, Sir Charles Bell and Dr. Marshall Hall, belong the chief merit of originality and enquiry. This organ, together with the nerves which it transmits to the various internal and external parts of the body, as we well know, is entirely beyond the control of the will; it is intimately united with the ganglia of the grand sympathetic nerve within the thorax, through the media of its contributary branches, and both of these conjoined form the centre of all the involuntary movements that take place in our system. Dr. Marshall Hall deduces several strong arguments in favour of the medulla oblongata being the seat of the passions. "There is good reason to con-

clude, says this physiologist, that the cerebrum is the seat of the ψυχη and of all the *intellectual faculties*. There is equally good reason to believe, that the medulla oblongata is the seat or nervous organ of the manifestation of the *appetites* and *passions*. In the idiot, in whom the cerebral lobes are struck with such atrophy and defective development as to annihilate every vestige of intellect, the appetites and passions are frequently not only unimpaired, but unnaturally strong; the appetite for food, sexual excitement, anger, and terror, are manifested in their turns in a remarkable degree. The arm, which is totally paralysed to volition or voluntary motion, in hemiplegia, is strongly agitated by surprise and other emotions. The seat of these emotions is, therefore, placed *lower down* in the nervous system than the *seat of volition* and of the disease; the influence of volition is intercepted by that disease; whilst that of passion is manifested in the most distinct manner." Query—Does any form of the blush take its origin from *this* seat of the passions, and if *one* does, may not *all* the *rest* be referred to the same source? To the former of these questions I reply in the affirmative; as every one must be familiar with the appearance of the blush, or rather, of the *flush* of rage—this is a *true* instinctive passion, and though there is no very apparent difference in the redness of the cheeks in this instance from what is observed in the blush of shame, still there

are many collateral symptoms by which one may easily be distinguished from the other; and the peculiar expression of the countenance, as already observed, is in itself sufficient to denote which is which. It is intrinsically the same impulse which produces this flush in man, that also inflames the comb of a turkey cock when swollen with rage. They are both examples of the same animal passion, differently exhibited, and may be produced without the intervention of the cerebral functions. But to the second query, I have to reply in the negative; for arguing from the preceding data, as well as a variety of other circumstances, which will be fully explained in the concluding part of this Essay, I here state my entire conviction that the seat of the impulse which excites the *true* blush does not exist in any part of this organ, or in the cerebellum.

The spinal marrow supplies all the *vital* organs with nervous influence—these organs whose functions never cease from the hour of birth to that when the last ray of life forsakes them. It supplies the heart with involuntary power, whose functions must be kept up without a moment of intermission, night and day, sleeping and waking. It supplies the stomach, the liver, the kidneys, the bladder, &c., with the same independent nervous influence; all these organs must be kept constantly in action for the maintenance and preservation of life; and in order to effect this purpose, the spinal and sympa-

thetic system unite in placing them entirely beyond the caprice of the will. One point of great interest, says Dr. M. Hall, is that which relates to the effect of *sleep* on the *cerebral* and on the *true spinal* systems. In fact, the former sleeps; the latter never sleeps. The levator palpebræ, a voluntary muscle, raises the eyelid in our waking hours; the orbicularis, under the influence of the true spinal system, closes the eyelids when the cerebral or voluntary muscle reposes. The connection which this part of the nervous system has with the phenomenon of blushing, consists chiefly in its forming, by implication, a part of that involuntary nervous chain or circle through which the blush exciting *spiritus animi* is circulated, and which I shall endeavour to explain more fully in the Section on the Mechanism of this phenomenon. For the present, it is sufficient to have pointed out that the spinal marrow supplies principally those organs whose constant and unremitting action is necessary for the maintenance of life; and all those parts to which it transmits its nervous influence are more or less beyond the control of the will. I shall now proceed to investigate the organ of the sympathies, and endeavour to point out its connection with the former.

OF THE SYMPATHETIC NERVES.

Extended along the vertebral column, from the base of the skull to the lower part of the sacrum, these great nerves, in some measure parasitic, *are said* to issue from the branches supplied them by the fifth and sixth pairs arising from each side of the brain; they live and are nourished, as it were, at the expense of all the nerves of the spinal marrow, from which they receive branches. The numerous ganglia which are distributed along their course, divide them into so many small systems, from which arise the nerves of the organs nearest them. Amid these ganglia, considered by several physiologists as so many little brains, in which is performed the elaboration of the fluid which they transmit to the nerves of the organs nearest them, no one is of more importance than the *semilunar ganglion*, situated behind the organs occupying the epigastric region, and whence those nerves originate, which are distributed to the greater part of the viscera of the abdomen. It is to the region occupied by that ganglion, where the great sympathetic nerves unite, and which may be considered as the centre of the system, formed by their union, that we refer all our agreeable sensations; *there it is we feel in sadness* a constriction which is commonly referred to the heart. Thence in the sad emotions of the soul,

seem to originate those painful irradiations, which trouble and derange the exercise of all our functions. The numerous filaments of the great sympathetic nerve are finer, and are *said to be* endowed with a more delicate sensibility, in *some instances*, than those of the brain; and the pain attending an affection of these great nerves is of a very peculiar kind; it tends directly to the extinction of the vital power—in these instances, the pulse is frequent and hard, but small; the face is covered with a cold sweat, the *features are sunk*, all the symptoms are alarming, and soon terminate fatally.

The use of the great sympathetic nerves is not merely to establish a closer connexion and a greater union between all the organs which perform the functions of assimilation, but likewise to free those parts from the influence of the *will;* a power of the mind so fickle and so varying, that life would be in constant danger, if we had it in our power to stop or suspend the exercise of functions, with which life is essentially connected. Professor Chaussier states, that the upper filaments of the great sympathetic nerves ascend along the internal carotid, and join the spheno-palatine and lenticular ganglions; and M. Ribes says, he has ascertained by dissection, that several very long and slender filaments follow the course of the branches of the internal carotid, and like them are sent to the base

of the brain, beyond which they cannot be traced; and, of course, all those parts which receive their nerves from this system must be considered as entirely beyond the control of the will.

There exists in the stomach, says M. Richerand, a union of the cerebral and sympathetic nerves, which explains the manifest dependency in which one of the three supports of life is found with the brain; a dependency so marked, that every strong affection of the soul, every violent agitation of the mind, weakens or even totally suspends the action of digestion in the stomach. We know from experience that, when the nervous system is extremely delicate, a small impression on any of the organs of sense will often produce considerable disturbance in the body. "In those cases," says Whytt, "the impression made upon the mind, or *sensorium commune*, by seeing others in a disordered state, raises by means of the nerves such motions or changes in certain parts of the body, as to produce similar affections in them; and hence it is, that the sight only of a person vomiting has often excited the same action in others; that yawning is propagated from one person through a whole company, and that convulsive disorders are caught by looking on those affected with them. Now, although we cannot explain how different impressions made on the *sensorium commune* should occasion, by means of the nerves, those various changes in the body, *yet*

that the nerves are really capable of producing very sudden changes in the circulation and distribution of the fluids, when the mind is variously affected, we have full proof in that redness of the face which accompanies a sense *of shame*, that increased flux of the *saliva* which happens to a hungry person upon the sight of grateful food, and that plentiful discharge of tears, which is often produced by piteous objects or tragical stories." The history of the *supposed* functions of these nerves is deeply interesting, especially as to their distribution and connection with the *complex vagus* nerve in the region of the stomach, all of which I shall have occasion to revert to in a succeeding Chapter.

CHAPTER II.

OF THE HEART AND CAPILLARY BLOOD-VESSELS.

The capillary circulation has long been a most fertile source of dispute among physiologists, especially as to the capability of the heart in propelling the blood, and maintaining its motion through the remote arterial branches. Some have alleged, that the impulse of the heart's action is altogether lost before the blood arrives at these minute vessels; and also state, that its circulation here is carried on by what is called capillary attraction alone; others again maintain, that it is by the property of *endosmose*, the principle by which the sap ascends in plants, that the blood is propelled through those minute vessels. But that great physiologist, Muller, and several others of the German school, deny in toto the foregoing doctrines, and confidently assert that the action of the heart is sufficient to propel the blood through the capillaries. "The motions of the heart," says this author, "are considerably

affected by both the exciting and depressing passions. The sensations of many parts are altered; the secretions, as those of the lachrymal gland and skin, are affected; the action of the capillaries is modified; hence the skin becomes red, or in other cases pallid; in short, the passions influence, first, the nerves engaged in the respiratory function, then through the medium of the spinal cord, all the nerves of the trunk and extremities, as well those of animal life as the organic nerves." And, again, in alluding to the sympathy that exists between the heart and brain, the same writer asks, "Does not the heart stand in the same relation to the mental emotions as the lachrymal organs, which are affected by every emotion of the mind when it reaches a certain intensity?"

Are not all these alliances between our vital organs sufficient to fill us with wonder and admiration of the exquisite harmony and adaptation which the Almighty has observed in the construction of our frames. Is it not pleasing, that we are enabled to look back and trace *ab origine*, that beautiful chain of action by which "the heart, and soul, and sense, in concert move;" and, further, to be enabled to point out an evidence of design in every link of this harmonious piece of mechanism. What other parts of our organic structure are more capable of exciting our wonder, or of filling us with gratitude for the plenitude and richness of the gifts

of our Creator, than the heart and its blood-vessels. In these organs circulate that fluid which has such a material connection with our existence, which has even been called life itself by some of the ancients, and the *soul* by others. We have, therefore, arrived at the most interesting part of our enquiries, viz., that which involves the whole arterial system, as concerned in our present subject, and its relationship with the involuntary nervous system, this being evidently the medium through which the exciting stimulus is conveyed from the sensorium.

The intent of this Chapter is to endeavour to explain the connection that exists between the *heart* and brain, and to demonstrate, as clearly as possible, the complicated nervous chain, by which *three* of the most important of the vital organs, viz., the *brain*, *heart*, and *stomach*, are united, combined, and harmonized into one grand whole. How the slightest derangement in the function of the one is reflected upon, and instantaneously affects the other, producing a general derangement and reaction in not only themselves, but in the entire system—thus affording another argument in favour of the *unity* of design in creation.

The heart, as is well known, preserves its organic vitality for some time even after it has been removed from the body; it may be seen to throb or pulsate on the table several moments after it is taken from the animal, and when this vitality seems

to have departed, from the tranquillity of the organ, its pulsation may be again excited, by applying various stimuli to its external surface. Some physiologists have asserted, that after it lies quiet for *many hours*, if it be pricked with a needle and made moderately warm, it will again *begin to move;* for which reason the ancients supposed there was a latent vital principle in the heart; and Galen has said, that its motion is innate. From this it would appear, that though the heart be furnished with the common causes of muscular motion, derived from the arteries and nerves, it further contains, within itself, a power of raising motions, which cannot be deduced from anything that we are hitherto acquainted with in the structure of the parts. "Cut off all the vessels from the heart," says Boyle, "and it will continue its motion;" thus the heart of an eel taken out from the body continued to beat, and though put under a receiver, and the air exhausted, its pulsation did not cease for the space of an hour; the heart of a flounder cut transversely into two parts, retained its motion for a great length of time, though the blood had been squeezed out of it by pressure, and both sides of it wiped with a cloth.

That the observation holds good in the heart of man, appears from the words of Lord Verulam, who says, in his Essay on Life and Death, "upon the embowelling of a criminal, (the former mode of punishment for those convicted of high treason,) he

had seen the heart of a man, after it was thrown into the fire, leap up for several times together; at first to the height of a foot and a-half, and then gradually lower * * *." Galen concluded, from similar experiments, that the heart does not stand in need of nerves for the discharge of its proper functions; that it is a mistake to think that the heart is a muscle, and that it is in a manner the "*fountain of native heat*."

Many other theories similar to these, respecting this wonderful property in the heart, *i. e.*, its *irritability*, were advanced and have passed away since the days of this illustrious physiologist; however, it is now universally admitted that the heart's action is intimately connected with the spinal marrow and involuntary nervous system, and through them with the brain and the whole of the vital organs.

We find from anatomical investigation that the heart is abundantly supplied with large and numerous nerves from different sources. We find the three cardiac nerves derived from the great sympathetic proceeding downwards through the chest until they arrive and unite at that point where the aorta arises from the heart.—Here we see them joined by the eighth pair and recurrent complex nerves, and also by branches of the spinal; all these finally unite in forming immediately behind the heart that net-work of nervous branches known by the name of the cardiac plexus; and in the meshes of this

plexus, we find several smaller ganglia interwoven and inclosed, the whole forming a beautiful nervous *wreath*, in which the heart is partially entwined.

From this plexus branches proceed in various directions; some pass backwards, encircling the posterior coronary artery, forming a plexus around it, and accompanying its branches into the substance of the heart; others pass round the aorta, and the anterior coronary artery, and form a net-work around it, the same as that of the posterior.

From this brief sketch of the anatomy of the heart, we may infer that these nerves being in themselves perfectly beyond the control of the will, must necessarily endow that organ which they so largely supply with their own peculiar involuntary nervous energy. It is true that there are cases on record in which it is stated that the heart's motion has been arrested at the command of the will, and one of those individuals who possessed this extraordinary power of volition was in the habit of constantly exhibiting himself before the public, until at length he fell a victim to his own rashness, for one day, upon a special occasion, having arrested his heart's action, and continuing the experiment somewhat longer than usual, he could not get it to move again when he intended, and immediately expired.

Are we to consider such cases as depending on a casual predominancy of the eighth pair of nerves over those more purely involuntary, or shall we re-

gard them as mere anomalies? The latter conclusion appears to be the most tenable, for in whatever light we regard such instances, they baffle all our inquiry, and are examples of the mysteries of nature, which are infinitely beyond all human investigation. We have now seen the chain of nervous connection that exists between the brain and heart, by which the emotions of the one are communicated to the other.

Offer an affront to a man who is now quite calm and undisturbed, says Van Swietan, and on a sudden, by a change in his thoughts, an universal change shall arise in the whole system; his *heart beats quicker* and stronger, his *pulse rises* higher and fuller, he grows hotter, his face swells, his eyes sparkle, and even a violent fever will sometimes follow that shall end in death. The impression on the sensorium in this instance affects the heart by sympathy, through the medium of the involuntary chain of nerves.

These great nerves, after supplying the heart, proceed onwards, as we have already seen, to the region of the stomach, which organ is highly endowed with their influence, and here the whole involuntary nervous system is concentrated into one focus, under the name of the "Grand Solar Plexus," from which emanate all those painful sensations so well known to the dyspeptic patient.

This nervous ganglion is likewise the seat of all

the depressing passions, as those of despondency, fear, &c., and in particular of that melancholy and heart-rending feeling commonly called the *broken heart*. Hence issue the sighs of affliction and despair, the feeling which prompts the suicide to commit that deed which "eternity cannot annul," and is oftentimes the seat of the distemper known by the name of "religious monomania." This ganglion consummates that circle which I have spoken of as uniting the brain, and heart, and stomach into one. There is a reciprocal feeling or sympathy existing between these organs, which binds them closely together, and to this harmony of connection is owing that wonderful faculty by which the impression made upon the mind or sensorium is almost instantaneously conveyed to the heart, stomach, kidneys, &c., and *vice versa*.

We in common parlance say that "we feel oppressed from a load at the heart," whenever affected by disagreeable news, or any reverse. Though the expression is forcible enough, and vulgarly received as *correct*, still it is far from being so. The feeling which we attempt to describe emanates not from the heart, or chest, but from the solar plexus of nerves communicating with the stomach. We sigh to relieve ourselves of the burden which we feel oppressing us, perfectly unconscious of the suspension for the time being of the functions of the stomach, which keeps up the state of feeling while the derangement lasts.

A slight blow of the fingers externally over this highly sensitive point has frequently produced instantaneous death. We have a case recorded of several men who were lifting weights for a wager as feats of strength, and one less powerful than the others, having failed in his attempts several times, one of the party advanced to him as he was about to make another trial, and giving him, as he thought, a gentle blow at the pit of the stomach, said by way of joke, "Leave the way for a better man; you will never lift it." The individual struck instantly fell dead on the spot. At the time his companion struck him he was completely off his guard; the abdominal muscles were evidently quite relaxed, and the impression was conveyed *directly* to the *solar plexus*.

The ancients would probably have inferred from this fact that the cardiac region was the seat of life, and that death was effected by the sudden and unexpected shock, and a total exhaustion or displacement of the *vital fluid*.

As the nerves of the heart and arteries, both large and small, are principally derived from the sympathetic and spinal system, it is but reasonable to infer, that the *ultimate* ramuscles of the arterial

tube, called the capillary system, which has eluded all research and investigation, is supplied by nervous filaments derived from the same source. Nerves have been demonstrated by M. Ribes on the minute arteries of the brain; and Dr. Macartney is of opinion that the arteries of the very smallest size receive nerves, on which the peculiar sensibility of these vessels depends, and by means of which the state of the small arteries is affected by remote and indirect impressions.

It is now almost universally admitted that the blood is circulated throughout the arterial system, as far as the capillaries, by the heart's action principally; but the manner in which this fluid is propelled through the "capillary system," as far as its junction with the veins, is still undecided; it is a most fertile source of dispute amongst anatomists and physiologists, both of whom promulgate doctrines and theories on this subject, directly opposed to each other. Amongst such a variety of conflicting opinions little can be expected from my humble efforts to elucidate the subject. However, I shall endeavour, briefly, to state both sides of the question; and as it is materially connected with the theory of blushing, I shall take the liberty of offering those views which appear to me as correct.

Here, then, the chief questions which propose themselves for our consideration are—First, By what means is the red colour, which suddenly rises

on the cheek in the act of blushing, produced? Second, Is it from an impulse of the heart and solar plexus of nerves, sympathizing with the mental emotion, and reflected upon the cheek? Or, Thirdly, Is it merely a *local* affection produced by some inherent property belonging to the small blood-vessels of the face in particular; or, by a certain stimulus conveyed to them by the filaments of the sympathetic nerves, which we have already seen accompanying and supplying the arteries with nervous influence, independent of the will? These are the questions which offer themselves for our immediate consideration; they involve all the theories of the capillary circulation, than which nothing in physiology is more interesting; and in our enquiries we must recollect, that it is stated, there are *two* capillary circulations, one propelling *red* and the other *white* blood; and that it devolves upon us to explain, whether these vessels of the cheek, in the natural state invisible, contain any fluid at all; or, are they merely "*vaisseaux vides*," as named by Bichât and others; and how they give admittance to the *red* blood on special occasions, as seen in the flush of rage, blush of shame, &c.

In reply to these queries, I may state—First, That the redness of the cheeks strikingly developed in the act of blushing—the flush of rage and glow of exercise, is produced by the red blood entering and circulating through vessels hitherto

invisible, either from their containing in their natural state a transparent fluid, which cannot be readily distinguished from the superincumbent skin; or else, that they are collapsed and contain no fluid previous to the blood entering them on these special occasions.

In treating of the capillary system, Bichât says, "It is established as an incontestable fact, that in many organs of the animal economy, the general capillary system is, in the ordinary state, traversed partly by blood, and partly by fluids different from it, which appear to be *white*." He says again, "Peut-être aussi y a-t-il habituellement dans ce système, des vaisseaux *vides*, et qui sont destiné à recevoir les fluides en certain circonstances." Now, it appears to be much more probable, that there are some of those minute vessels *empty* and *collapsed*, and destined to receive blood or other fluids on certain occasions, than to suppose that they naturally contain whitish or transparent fluids which give way, that the blood may occupy their places on certain emergencies; for, were this the case, a question immediately arises, viz.—Where does this whitish fluid go when required to make way for the blood? According to natural laws, no two bodies can occupy the same space at the same time—one must evidently yield to the other; surely this white fluid cannot be infiltrated into the cells of the cellular tissue; and we may reasonably suppose, that there are no *new* vessels ready to receive it.

Bichât's comment upon the rapidity with which the blood traverses the capillaries of the face, and those of different parts of the skin, bears me out in this hypothesis; he says, "On conçoit même difficilement la rapidité du passage du sang dans les capillaires de la face, et dans ceux de differentes parties de la peau, si ces vaisseaux contennaient un fluid qui dût-être deplacé pour ceder sa place au sang."* And as a proof that the blood, on these emergencies, is propelled into and contained in real vessels, instead of being infiltrated into the surrounding cellular substance: the same author alludes to the appearance the conjunctivæ present when slightly inflamed; he adds—"Souvent en peu de temps elle change son blanc en un rouge vif, parceque le sang remplit des vaisseaux ou auparavant il ne passait pas; vous voyez que le sang accumulé dans cette membrane n'est point infiltré, mais qu'il est contenu dans des vaisseaux réels."

Boerhaave supposed that in these instances the capillaries became so enlarged as to allow the *thicker* parts of the blood to enter, and this he called an *error loci*. In commenting upon this aphorism, Van Swietan makes the following observations:—"When by the increased motion of the blood the entrances of the arteries of a descending series are enlarged, the grosser particles of the blood will thereby gain admittance into vessels which natu-

* Systèmes Capillaires.—Encyclop. des Sciences Medicales.

rally ought not to contain them. Thus, when the entrance of an artery (springing from an artery that carries red blood) through which there only ought to flow a *serous liquid*, is dilated, *the red blood shall enter this serous artery.* If a man in health runs violently, his face will begin to swell, and grow red in such places as are not naturally apt to be red; the *tunica adnata* of the eyes will have its vessels filled with *red blood*, whereas naturally these vessels have no red blood in them at all."

The following are M. Magendie's views regarding the circulation of this colourless fluid in the capillary system, and are directly opposed to those of an eminent English writer, as we shall presently see:—

"The blood is not the only fluid that moves in the beautiful rete formed by the capillary interlacement. There are certain organs and tissues into the capillary system, of which that fluid does not appear to enter at all in the normal state; but if you push an injection into the vessels, it will penetrate into the canals wherein fluids of another description usually circulate, quite as well as into those in which the blood is ordinarily found. Thus, when the material injected is well fitted for the purpose, and cautiously introduced, the serous membranes will become covered with vascular arborisations. Now the vessels you descry on its surface, when thus injected, were not, during life, traversed by

blood; *white fluids only* were contained in them, but as these hold no opaque granules in suspension, their mode of circulation cannot be accurately observed during life.*

Dr. Macartney, in his recent work on "Inflammation," explains this phenomenon in the following manner. The arteries (says Dr. Macartney) which only carry the colourless parts of the blood or the serum, becoming under inflammation so much *dilated* that they admit the red particles. In the transparent membranes, as the pleura, peritoneum, &c., this is well illustrated, on which the red vessels may be counted, when inflamed. In the transparent cornea the red vessels are very distinct. The vessels of the skin are peculiarly numerous and excitable, and therefore when it is inflamed the redness has a painted or stained appearance, the vessels being so much crowded together that they are not distinguished from each other. The same is found on the mucous membrane, and in all the parts of the body endowed with *much sensibility* there is a *copious supply of red blood;* thus the skin and mucous membranes, which are the two great sentient surfaces, receive a great quantity of arterial blood.

Before advancing any farther into the doctrines of inflammation, let us inquire what relationship (if any at all) exists between the phenomenon of blush-

* Magendie's Lectures on the Blood.—Lancet, Dec. 22, 1838.

ing and this subject. In the work just quoted, Dr. Macartney states that "*heat* and *redness* are produced in the skin by a merely excited state of circulation, as may be observed in *blushing*, and in the turgid state of various erectile tissues, as the genital organs, the skin about the turkey-cock's neck, and many other similar structures." But I shall go farther, and endeavour to prove that there is little or no difference between both these phenomena. In an *intense* blush we have all the symptoms which characterise inflammation. Dr. Macartney has allowed two, viz., " heat and redness," to which I shall add the remainder, pain and swelling; although the pain be not acute, still it is deeply felt, for in this instance it has a double origin—it is *moral* as well as physical, which deepens its sting.

Then, in inflammation we have rubor, calor, dolor, et tumor, as its common diagnostic symptoms. In blushing we have the same—so far, so well—but still there is one important *internal* symptom belonging to the former, not yet mentioned, viz., the altered secretion set up by the capillaries of the inflamed part. How are we to dispose of this, in assimilating the two phenomena? We have no instances recorded in which there has been found any depositions, any alteration in structure in the cheek of an individual prone to blush—and we generally observe the face resume its usual appearance a few moments after it has subsided.

The capillaries of the external sentient surface, (the skin) "with the nerves which doubtless accompany them," are the parts principally engaged in both cases, and if their functions become altered in one, why not in the other? The reason is obvious—the inflammation of a part must be continued for *some* time before any alteration can take place in its structure, even allowing the capillary system to deviate by some peculiar unknown power from its usual function in all cases of inflammation. Were this latter process as transitory and fleeting as that of blushing, we should have but few instances of structural deposits, alterations, &c., taking place in the vicinity of inflamed parts; and, on the other hand, if the blush could be kept up for a given time, reasoning from analogy, we must infer, that structural derangement would eventually take place; thus showing us that nothing is ordained in the conformation of moral or physical man without some final object—some wise purpose; for, in blushing, were the efflorescence to be continued to any lengthened period, the great object for which it was designed would be altogether thwarted—in the first place, by rendering the phenomenon less striking to the observer in consequence of its *permanency;* and, in the second, by tending to produce a derangement in the functions of the parts—a result which could never have been intended by Providence in this instance—Here the

wisdom and goodness of God is strikingly manifested, for, is it not by the sudden and momentary *suffusion* that the mind announces its consciousness of having erred—and, is it not from the same cause, viz., the evanescent nature of the blush, that the health of the part is preserved—both proclaiming the phenomenon to be one, not of chance, but of design. Although I do not go so far as to state, that all the effects of inflammation could be produced by this phenomenon if prolonged sufficiently, yet the intimate relation that exists between both is self-evident and apparent.

Dr. Marshall Hall denies the existence of increased or diminished action in the capillaries during inflammation—according to his view, a peculiar alteration takes place on the internal surface of these vessels, which causes the globules of the blood to adhere to it, and consequently produces stagnation, which constitutes the essential character of the disease; and in drawing a distinction between blushing and inflammation, he says, "It is probably by the fact of *stagnation*, that inflammation differs from blushing, from eruptions, and in some degree from erysipelas." This author also denies the existence of serous vessels which exclude entirely the red globules of the blood. "It has been supposed," says Dr. H., "by many writers that there is a series of blood-vessels which are so

minute as not to admit the blood globules; they, therefore, carry the serum only This is the case in the tunica conjunctivæ of the eye, and other membranes destitute of colour. All this is a mere and unfounded hypothesis—there are no such serous, globuleless vessels at all. Take the web of the frog, choose the palest, and what appears to be the most bloodless part of it, and place it under the microscope, you will see myriads of capillary vessels, along which the blood, with its globules, flows continuously; inflame this web, and observe it with the naked eye—it has become red—it now possesses, according to the authors of the hypothesis, vessels which it did not before, and which convey the globules as well as the serum of the blood; look at it under the microscope, and you will find that the real and true change is, that the capillary vessels are somewhat enlarged and crowded with *stagnant* blood globules, which, from their augmented number, give the reddened hue to the part. In a word, single globules, flowing along with the serum of the blood, do not impart a redness detectable by the eye; it is accumulated globules, in enlarged or larger vessels, which communicate this colour; it is their accumulation which constitutes the difference in the colour of a part, otherwise pale, white, or transparent, as it becomes affected with inflammation."

Such are the conclusions Dr. Marshall Hall has

arrived at, after a long and careful investigation into this interesting subject, and with regard to his views respecting the non-existence of "globuleless vessels," contrary to the opinions of Boerhaave, Haller, Bichât, &c. I must say, that they appear much more plausible and much more easily reconciled to the known laws of physiology, than those of his predecessors: according to Dr. Hall's view, we can readily and rationally account for the velocity with which the face becomes crimsoned in the act of blushing, the mechanism is greatly simplified, in as much as there are no *new* vessels required, either to admit the circulating blood into channels through which it naturally ought to flow, or to receive this said whitish fluid, which if it exists, must evidently give way to the red globules, and which we must infer is then exuded into the adjoining tissue, (an improbable event,) or else contained in *real* vessels, which had been previously empty or collapsed.

With regard to the distinction which Dr. Hall draws between inflammation and blushing, I do not agree, and beg, respectfully, to differ from him on this point; if Dr. Hall had observed the phenomenon in its *intense* form, as seen on the cheek of individuals the most susceptible, he would recognize a retardation of the blood on the surface, a "stagnation," or something akin to it, even after the paroxysm had subsided; and which I have seen

continue for at least twenty minutes after the *drooping* aspect of the features had passed away; this symptom giving evidence of the *moral impulse* being suppressed; for I defy any one, in the act of blushing, to look at, or stand the glance of another person present. The eyes are irresistibly borne down, and the whole features droop, or languish in opposition to the will.

My reply to the second of the questions laid down at the beginning of this Chapter is—That it is fully ascertained by most eminent physiologists, Burdach, Muller, &c. that the heart is capable of propelling the red blood into the remote capillaries of any part of the cutaneous surface—for instance, those of the face, scalp, ears, &c., or either extremities.

The latter of these authors has some peculiar views regarding this subject, which I may here mention—"The mutual action or *affinity* between the *blood* and the *tissues* of the body, which is an essential part of the process of nutrition, is, under many circumstances, greatly encreased: and an accumulation of blood into the dilated vessels of this organ is the result. It is seen, for example, in the reproductive organs when excited; in the uterus during pregnancy, stomach in digestion, &c. The local accumulation of blood with the dilatation of old and the formation of *new vessels*, is, however, seen most frequently in the embryo, in which new

organs are developed in succession by a process of this kind (vital turgescence of the blood-vessels). *This condition* may be excited very suddenly, as is seen in the instantaneous injection of the cheeks with blood *in the act of blushing*, and of the whole head under the influence of violent passions; in both these instances the local phenomena are *evidently induced by nervous influence.*" *

With regard to the third query—Is the increased redness of the *cheek* in blushing merely a *local affection* depending upon its organic sensibility, upon some inherent property belonging to the small blood-vessels of the face in particular—or upon a certain stimulus conveyed to them by the filaments of the sympathetic nerves, which I have already spoken of, as supplying the ultimate arterial branches with involuntary nervous influence? I have only to state, in reply, that the capillaries of this part of the sentient surface of the body are not in *themselves* sufficient to produce a moral illustration of shame upon the cheek. I am aware, that there are many arguments in opposition to this statement—but, nevertheless, I maintain that there is a *vis a tergo*, an impulse from the brain urging the blood forward to the surface of the face, in every instance in which the blush may be excited. There is, apparently, a defined circle, a chain of

* Handbuch fuer Physiologie.

action wherein the brain forms a principal part, through which the nervous influence must circulate, before the blood can appear on the cheek: of this I shall speak more amply in the third division of this subject when treating of the anastomosing of the nerves.

Before concluding my remarks on the capillary blood-vessels, I have another query to investigate, still more interesting than the preceding. It is this —Why does the blush take place on the cheek in preference to any other part of our system? Is the feeling of this region more exquisite than that of any other part of the dermis? Is its organic sensibility more highly wrought, or more highly endowed with nervous influence and vascularity, than all the rest of the cuticular surface? These questions, interesting in themselves, lead to investigations and inquiries doubly more so.

Every student of anatomy must have been forcibly struck with the peculiar arrangement of the capillary vessels beneath the surface of the cheek, as seen by injection. Their size, the intricacy of their interwoven communications with each other, forming a net-work, at first sight of confused and undefined vessels, (an appearance so different from that observed in other parts of the body,) and such as cannot fail to attract the attention of the student—to bid him pause and reflect upon the probable *design* of the Omnipotent in ordaining that this iso-

lated portion of the human skin should be more abundantly supplied with red blood than that of any other part of the same external sentient surface.

If we inject an infant even with common coarse size, we see the face growing darker and darker as the injection advances, until it finally assumes the colour of venous blood. It not unfrequently becomes perfectly black; at other times it will assume the colour of a person who died from apoplexy; all these circumstances confirm us in the belief that, even from birth, this part of the body is more highly organized, more replete with arterial blood, than any other portion of the external surface. It still remains for me to explain why this is so, for as yet I have only alluded to the fact of such being the case; but, before I can properly explain all its bearings, and offer my own conjectures upon this interesting subject, I must first make a few observations on the *Dermoid System*, especially that part of it belonging to the face, a subject intimately connected with the physiology of blushing and the peculiar arrangement of the capillaries in the cheek—that external arena of the emotions of the soul—that focus of every involuntary exhibition of internal feeling and sympathy.

CHAPTER III.

OF THE DERMIS, OR SKIN OF THE CHEEK.

"To man it is a sensitive limit, placed on the boundaries of his soul."—BICHAT.

THE skin is composed of three layers—the *epidermis* or scarf-skin, *rete mucosum* or seat of colour, and the *cutis* or true skin. It is extremely porous and extremely vascular; a child in full vigour comes into the world, from this circumstance, scarlet, and it is also endowed with intense sensibility. Some parts of the skin have more feeling than others; the lips, for example, as Haller says, "*ad basia destinata*," the glans clitoridis, glans penis, &c., with a similar intention. It is more dense and thick on those parts which nature has designed for bearing pressure or burthen, as seen on the back, on the soles of the feet, and palms of the hands; and on the contrary, we find the skin on the *fore* part of the body, on the inside of the arms and legs, and when its surfaces touch opposite surfaces, to be

much more thin than on those parts just mentioned. It is extremely thin on the lips, and allows the colour of the blood to shine through it.

The epidermis, the exterior layer of our common integument, says Mr. Lawrence, is the thin transparent or light-greyish pellicle raised by a blister; in the natural state it adheres closely, almost inseparably, to the subjacent parts, and is accurately fitted to the cutis, having folds and lines corresponding to all the inequalities of that organ. It presents no traces of fibres, laminæ, or cells; it has no blood-vessels, absorbents, or nerves; therefore, though perforated by the hairs, by the excretory tubes of cutaneous follicles, by the exhalent mouths of the capillaries, and possibly by absorbent orifices, it is incapable of sensation and all vital actions, extravascular and inorganic. It is a protecting sheath for the finely organized and sensible skin; and serves the further purpose of preventing evaporation, by which that organ would be inevitably dried. Thus the external surface of our living machine is in a manner dead; and objects applied to it act on the cuticular nerves through this insensible medium. When preternaturally thickened, it destroys sensation; if removed, as by blistering, the contact of bodies gives pain, but does not produce the appropriate impressions of touch.

The delicate rete mucosum, generally regarded as the seat of human colour—of all the diversified

tints which characterize the various races of men, is interposed between the epidermis and cutis, or true skin—In the Negro it is more clearly demonstrated than in Europeans. Malpighi, who discovered its existence, announced that it gave colour to the skin; and this opinion is now admitted by all. In the Negro it is black; in the Chinese yellow; in the aboriginal American, copper-colour; while, in the European, it possesses different shades of red and olive, more or less approaching to whiteness. It is a deficiency of this *rete* that gives to the skin of the Albino a peculiar dead or pallid cast, something like that of leprous scales; it is likewise owing to their want of pigmentum, that the eyes of this being are so weak as hardly to see an object by day, or bear the rays of the sun. The rete is closely adherent to the cutis; and according to the interesting experiments and conclusions of the late Dr. Wallace on the Negro's skin, it appears, that the cohesion between the black pigment and the tissue in which it is deposited is so great, that the former could not be removed even by rubbing the surface with lint. The next layer we come to, is that which has the greatest bearing on our subject, *i. e.*, the cutis or true skin.

The areolar tissue of the cutis is permeated in every direction by countless myriads of arterial and venous ramifications, of which the ultimate capillary divisions occupy the external or compact surface of

the organ, and forms a vascular net-work over the entire body, eluding our enquiries and defying calculation by the number and fineness of its tubes. In the glow of exercise or the *flush of shame*, in the excitement of fever or the eruption of measles, scarlatina, &c., these cutaneous vessels are filled with blood; they may be injected with coloured fluids after death. Their ramifications are particularly numerous and subtile in those parts of the cutaneous organ which possess the most exquisite sensibility; and where the surface is found on minute examination to be covered by numerous fine processes called villi.*

The colour of the cutis is uniform, or very nearly so, in all the varieties of the human race, and depends entirely on the state of its capillary blood-vessels. According as they are full or empty, it may vary (as we see in the white races) from a more or less florid red, constituting what artists call flesh colour, to the waxy paleness of fainting or exhaustion from hæmorrhage. Maceration in water makes its areolar tissue quite white, and injection with size coloured by vermilion gives it a deeper or lighter shade of red, according to the force employed.†

* It is the external vascular surface of the cutis, with its papillæ or villi, that Bichat has described as a separate stratum, under the name of CORPS RETICULAIRE.

† Lawrence's Lectures on Man.

Before birth the cutaneous surface of the cheek contains more blood (comparatively speaking) than any other part of the same system, but then it is dark venous blood that circulates through its vessels. The fluid is as yet perfectly unaerated, and continues so until birth, when the new-born being breathes for the first time the oxygenated atmosphere in which he is to live. There now takes place a complete revolution in the dermoidal system; the skin, which was hitherto of a blue or livid shade, assumes a scarlet colour from the arterial blood traversing those vessels which were formerly supplied by venous fluid alone. The skin of the face does not immediately assume that rosy tint which afterwards takes place there.

For some months after birth (says Bichât) that lively carnation is not yet observed which soon after is spread over the cheek, and which begins to manifest itself towards the time the sinuses are formed, and the teeth cut, at which period the process of nutrition attracts more vital activity to that part. This is generally observed during the process of dentition, as may be seen in the frequent flushings to which the face is subject during that critical period, and we can observe through the exquisitely delicate skin of the infant, with a magnifying glass, numbers of the minute vessels through which the blood is circulating, which are united and interwoven in a beautiful manner with each other, and

appear to be *immediately* beneath the external cutaneous surface.

M. Magendie stated in his lectures on the blood, delivered at the College of France, that the movement of this fluid in the capillaries of one's own body may be seen in the following manner:—"Place yourselves in a strong light, close your eyes, and then stretch the upper lids so as to render them as thin as possible; they will permit the passage of a few luminous rays, and you will perceive, though of course indistinctly, the blood moving from the upper part of the lid towards the tarsal cartilage." I have frequently tried this experiment, and found that the circulation appeared most distinct when the light was *moderate*, not *strong*, as observed by M. Magendie, and any individual may convince himself of this by trying the experiment first close by a strong light, and then gradually withdrawing the eye to a given distance, in order to lessen the intensity of the luminous rays.

We now arrive at the investigation of that question I omitted answering in the last Chapter, viz., Why does the blush strike on the cheek in preference to any other part of the dermoidal system?

In the concluding remarks on the capillary system, I have alluded to the peculiar arrangement of the vessels of the cheek, and the facility by which that anatomical arrangement admits the blood to its surface. Now, I shall endeavour to explain why

this is so; and before offering my own peculiar views on this point, let us first hear the observations of the immortal Bichât, on the same subject.

Here I shall make a remark, says this physiologist, which to me appears very important—it is, that the capillary system of the face is much more liable than that of any other part to be permeated with blood—First, This is obvious in the two cases I have just mentioned, (after violent running, and during the hot stage of fever,) wherein the action of the heart is increased. Secondly, In passions, the skin remains the same in all other parts, whilst this suddenly flushes or turns pale. Thirdly, We know that the physician frequently consults the state of the capillary system of the face, because it is most generally influenced by that of the internal viscera; that it is filled with or void of blood accordingly as it is sympathetically affected, &c.

From what does this remarkable susceptibility of the capillary system of the face to admit red blood proceed? I believe three essential causes give rise to it—First, The way is already open, since the colour of the cheek proclaims its presence, its quantity only is increased, whilst, whenever another part of the skin is flushed, the blood it contains is nearly accidental. Secondly, The anatomical arrangement of the capillary system is better accommodated there, than in other parts, to this influx of the blood; for, it appears that there is a

more ready communication between this system and the arteries of the corium. This is proved by injection, in which the face colours with the utmost facility. There is not an anatomist, I dare say, who has not occasionally been struck with this phenomenon in infants particularly, in which, if the coarse injections of our dissecting rooms pass even imperfectly, the face becomes *quite black*, whilst very little fluid penetrates the other parts of the cutaneous system. Thirdly, It appears that there is a quicker sensibility in the face; in fact, the stimulant that attracts the blood to this part does not act with the same force elsewhere; for instance, a blow upon the ear will redden the cheeks more than a similar blow applied to the arms, &c.

The blood is withdrawn from the capillary system of the face with the same rapidity as it flows to it; in the space of a moment, passions will alternately impress upon the features both the fiery complexion of a fever, the paleness of syncope, and also every intermediate shade. It is the facility with which this fluid penetrates those parts that colours the living picture, as it were, in which the divers passions alternately tinge the features with a thousand different shades, which fade away, return, change, and are modified, according to the state of the mind.

I have observed in this respect, that the face affords to our passions three means of expression—

First, The capillary system, perfectly *independent of the will*, and which often betrays what we wish to conceal. Secondly, The muscular motions, which, by contracting or expanding the features, express melancholy and grief, or joy and happiness. Thirdly, The state of the eye, an organ which, as Buffon has remarked, not only receives the sensations, but also expresses the passions. The *two latter* circumstances are, in some means, voluntary, at least we may feign them, whilst we could not be deceived by the first. Anger, joy, &c., may be imitated by frowning, by laughing, &c.; *but it is the* Rouge *by which the actress represents modesty and innocence;* let it be wiped off, and the paleness of fear and terror instantly appears. I shall add another essential observation in respect to the capillary system of the face, which is, that its tendency to be over-run with blood disposes it to become more frequently the seat of a multitude of affections. Erysipelas is more frequently detected in this part than in any other; it is the principal seat of the pustules in smallpox, &c.*

With regard to all the statements of this author, I perfectly agree, with one single exception, which is this: "In passions," says Bichât, "the skin remains the same in all other parts, whilst this (the skin of the face) suddenly flushes or turns pale."—

* Système Dermoïde, pp. 668, 669, Anatomie Générale, par Xav. Bichât.

That this is not strictly correct I am certain will be readily allowed, for many cogent reasons—First, In the intense blush, as seen in some delicate females, we may observe, that not only the skin of the face, but that of the ears, scalp, neck, and bosom, assumes the same crimson aspect; this is not a rare phenomenon; it may be observed in almost every ball or drawing-room; and with which I am sure every one is familiar. I have oftentimes observed the blush *commence* on the neck and ears, and then spread to the cheek, when all three were engaged together. How are we to account for this? Are we to look upon such a case as an exception to the general rule, as a lusus naturæ? No, the question is not insolvable; it appears to me to be very easily explained:—

It is the custom of all nations, as already observed, to leave the face bare, whatever may be their creed or location. In cold, or even temperate climates, as our own, the external atmosphere, which is below the heat of the body, constantly acting on the exposed surface of the facial skin, naturally attracts blood to the part, not for the sake of *beauty*, but for the caloric which it gives off. Now, the constant ingress of blood to this particular part, which is kept up through life by the very same means that first attracted it there, must render the minute arterial tubes more dilatable, and, consequently, more liable to become filled with red blood

on any case of emergency, than in any other part of the same system.

Thus it is, that in a temperate climate, we observe the fairest skins and most rosy complexions; and in those countries beneath the tropics we observe the very reverse. According to the aforesaid counter-stimulant law, the neck and bosom of a female, who, in compliance with the custom of her country, and the fashions of society, keeps them constantly exposed, must become more plentifully supplied with animal heat than they would require if equally covered with the rest of the body. Then, how is this heat to be procured? The blood, the source of all heat, must traverse through "gates and alleys," where it was not required before, to diffuse its genial warmth, convey increased vitality, and its natural consequence, susceptibility, to the part concerned. This increased flow of blood, together with the anatomical arrangement and exquisite delicacy of the skin in this region, renders it more accessible to the red fluid than other parts which are not exposed, and finally brings its organic sensibility on a par with that of the cheek.

It may be stated in opposition to the foregoing theory, that the peculiar redness of the cheek is often confined to a circumscribed spot, and is not diffused over the whole face; and, at the same time, it may be asked, why does not the neck

become rosy as well as the former, as from the above reasoning the laws of the one should equally apply to the other. It has been already stated that the capillaries of the face have an arrangement peculiar to themselves, for the express purpose (as we must infer) of colouring and diffusing heat over this part of the body, which is generally kept bare, and seems to have been originally intended by nature to be so, from its singular peculiarity of organization, which we must certainly conceive to have been so constituted for some wise end.

Although a redness similar to that of the cheek in its natural and healthy state is not observable on the neck in those instances alluded to, yet that the minute blood-vessels of this part are more susceptible of the blood's ingress, or in the words of Bichât, that "the way is more freely open" for the admission of this fluid than in other parts, is sufficiently proved by the fact of their being instantaneously filled in the act of blushing, and partaking of as deep a scarlet colour as the cheek itself. The organic sensibility of this region must be highly developed in order to render it so susceptible. The blood must have been in greater abundance on the external surface of the dermis or true skin, the circulation in the capillaries immediately beneath the epidermis of this part more lively and free than elsewhere, and owing to the increased vascularity of the neck, scalp, ears, and bosom, arising from the

causes already explained, the blood is as easily drawn to their surface from any impulse of the sensorium, as exemplified in some of the passions, as it is to that of the face in the act of blushing. I must therefore conclude that *the face is not the only* part which colours.

It has been stated, and I have heard individuals repeat the assertion, that in the act of blushing the same glow of heat that is felt upon the cheek is a moment previously experienced in the epigastric region, as if a harbinger of what was about to take place. That this is the fact I have not the slightest doubt, and we may reasonably infer that a point so extremely sensitive as this is, must participate more or less in the general sympathetic and organic emotion. I have already alluded to the abundant supply of involuntary nerves with which this region is endowed; it is, as it were, the focus of *involition*, whence emanate a variety of sensations peculiar to this place, sometimes pleasing and sometimes painful, for which reason it has been called by the illustrious Hunter, "the sensitive centre," or "*centre of sympathies*."

Every individual about to blush is conscious of a peculiar sensation in this particular region *before* the phenomenon actually takes place, and of this impression, and the probable influence it has in stimulating the vascularity of the cutaneous surface in its immediate vicinity during the production

of the blush, I shall discuss more fully in the Third Section of this Essay, or that which bears exclusively on its physiology.

To me the construction of these parts (the apparatus of the sympathies which I have just spoken of) has long been a source of reflection, nor do I think any individual can meditate even for a moment on the subject, without being impressed with a feeling of happiness and delight on observing the harmony of movement of these delicately organised structures, and the evident security with which all are arranged, combined, and made effectual, not only for sympathizing with every emotion of the soul, but likewise for fulfilling the great end for which their exquisite adjustment was designed—the maintenance of *Life*.

I have now concluded my observations on the "Anatomy of Blushing," and am fully aware how imperfectly they have been made. It was not my intention to go deeply or minutely into this part of the subject, as avowed at the commencement of the Section. I deemed it merely necessary to give an outline of the construction and arrangement of the principal parts concerned in the production of this phenomenon, and have accordingly confined my anatomical remarks within as small a compass as possible; if I have erred in this respect I have to crave the indulgence of my readers, as brevity was the main object, and an Essay of this kind, intended

principally for the general reader, would not be adapted for abstract physiological inquiry. I have endeavoured, though, perhaps, in a limited sense of the phrase, to give the "*utile et dulce*" in these pages, by drawing moral inductions from natural phenomena, both pleasing and interesting in themselves; and if this subject be regarded by the reader with the same interest as that with which I have looked upon it, my expectations will be fulfilled.

SECTION THIRD.

THE MECHANISM OF BLUSHING.

CHAPTER I.

OF THE SENSATION OF BLUSHING.

In the preceding pages I have described the "Anatomy" of the parts engaged in Blushing—I have there treated of the brain and spinal marrow, and of the voluntary and involuntary nerves emanating from them. We have seen that these which were placed beyond the control of the will, or in other words, the nerves of involition, were most particularly engaged in the production of this interesting phenomenon. I have alluded to the epigastric centre, where the whole influence of the involuntary nervous system seems to be concentrated in the semilunar ganglia or solar plexus, whence arise such a variety of sensations, both painful and otherwise, that the *ancients* believed it to be the seat of the passions—the source whence every emotion of rage, fear, hope, joy, and sorrow had their origin;

and some even honoured this region as the exclusive residence of the soul. I have explained the sympathy that the heart and stomach evince in every mental emotion, particularly the heart, which never fails to participate in the slightest disturbance of the mind. I have pointed out how highly both of these vital organs are endowed with the nervous energy of involition, how their functions may be carried on by night as well as by day, in our sleeping and waking moments, always the same —sleepless and inexhaustible. This vital action going on from the cradle to the grave, forcibly proclaims the wisdom of the Deity in thus guarding the wonderful mechanism of our frames against constant and inevitable death. I have, likewise, investigated the minute blood-vessels or capillary system, as being intimately connected with this subject—we have seen them interlace with each other in a thousand different ways, defying all calculation, and I have offered an explanation why the cheek and neck in particular should be the seat of the blush—why the minute vessels of these parts of the body should be influenced by the emotions of the mind, exclusively, in admitting the red blood to the surface of the skin, which is not observed on other parts.

I have concluded the Second Section of this Essay with some observations on the dermoidal system generally, but more particularly on that part

belonging to the cheek; and have endeavoured to explain the anatomical arrangement and construction of the different layers of this organ, as observed both in the Negro and European. We have seen that the capillaries in the dermis of the face, neck, and scalp, communicated much more freely with each other than those of other parts of the same organ; that their arrangement was peculiar in this respect—and from this peculiarity arose the great liability of the skin in these places to become invaded with blood under certain circumstances.

Having already shown the anatomy of the parts concerned in the production of the phenomenon—I have now to unite all these into one, and describe the *Mechanism* by whose action the blush is finally brought forth upon the cheek.

No one who has arrived at the years of maturity but must be more or less, familiar with that peculiar and indescribable *sensation* which immediately precedes the appearance of the blush on the cheek.

After the impression is made on the sensorium which is to excite this phenomenon, we become immediately conscious of what is about to take place—we feel that the will is overpowered—and, for the time being, is rendered subordinate to the mental powers, and the emotions of sympathy. Now, from the feeling of our own helplessness, like a bad swimmer when out of his depth, we become flurried,

and in our eager attempts to avert the threatened result, by endeavouring to expel from the mind or imagination that association of ideas which is about to bring it forth, we only fix it the more firmly, and ensure its full development, to the deep mortification and prostration of our will.

Presently a kind of fluctuating glow pervades the entire frame—there is great mental confusion—the eyes languish, and never look towards the bystander —the countenance loses its wonted animation—every feature seems to droop—the head itself hangs, as if endeavouring to conceal from external gaze the mental emotion which is about to be reflected from the soul upon the face. There is a thrill or throbbing of the heart, which is oftentimes visible externally—we feel a momentary oppression in the region of the stomach or centre of sympathies, and semilunar ganglia—the breathing becomes affected in the general sympathy, and a stifling follows as in grief—all self-possession is lost for the moment —*the voice becomes changed,* and the vague manner of speaking is not unfrequently the harbinger of the deep and burning blush which is soon to follow.

The individual concerned often feels a peculiar sensation similar to the epileptic aura rising from the præcordia upwards, as if it was the impulse which the stomach had received from the brain, being reflected back upon the face; all this takes

place immediately, and follows the first mental impression. The blush is now felt stealing to the surface of the cheek—the skin begins to tingle, and before the phenomenon is perfected, there is pain, heat, redness, and swelling, or in other words, a species of temporary inflammation ensues. When the blush is intense, an overwhelming embarrassment is the result; there is not a vital organ in the body which does not participate in the general emotion; and it is even affirmed, that the corpora cavernosa become *injected*, which must evidently take place from an engagement of the spinal nerves, through the media of the *sympathetics* in *this* particular instance.

As my theory of the Physiology of Blushing is principally based upon the conviction of an anastomosing or joining of the minute filaments of the organic and complex nerves, I shall here make some observations on this subject.

CHAPTER II.

OF THE ANASTOMOSING OF THE NERVES.

Willis was the first anatomist who gave an accurate description of the brain and nerves. He was also the first who endeavoured to explain the various instances of sympathy between the different parts of the body from the *communications or anastomoses of their nerves*. Vieussens afterwards adopted and illustrated this doctrine further, and his views were embraced by the majority of writers down to the time of Whytt. This latter author, in his work on Nervous Disorders, where he treats of the "structure, use, and sympathy of the nerves," has endeavoured with much energy and argument to subvert this doctrine. The prevailing opinion (says Whytt) has been that the sympathies are owing to the communications between the nerves, and particularly to the connection which the intercostals have with the fifth, sixth, and eighth pairs, and with almost all those which proceed from the spinal marrow. Upon this principle it has been thought easy to

trace the various sympathies not only between the several parts of the *abdomen*, but also between them and the head, neck, thorax, and extremities; but, however plausible this theory may appear at first view, and how readily soever it may seem to explain many remarkable instances of *consent;* yet a more strict examination will show it to be liable to insuperable difficulties.

Professor Whytt, in endeavouring to subvert the theory—" that the sympathy of the several parts of the body was dependent on a *union or anastomosis of their nerves*," has laid down a series of obstacles, all of which do not appear to me as being perfectly correct. The following are a few of his arguments against this theory :—First, Since every individual nerve appears to be quite distinct from every other, not only in its rise from the medullary substance of the brain or spinal marrow, but also in its progress to that part where it terminates; it follows that the various instances of sympathy, observed between the different parts of the body, cannot be owing to any communication or anastomoses of their nerves: * * * But," he adds, "lest it should be alleged that the course of the nervous filaments in the *ganglia* is so intricate, that it is not altogether clear whether they may not intermix or communicate with one another in their passage through those bodies; it will be necessary to offer *some less doubtful* arguments for proving that the sympathy of

the several parts does not depend on any union or anastomosis between these nerves. Secondly, If there were any *anastomosis* or real communication between the nerves of the same or different trunks, either in the *ganglia* or elsewhere, it is natural to think that *a confusion* would necessarily take place in our sensations, as well as in the motions of our several muscles; for the impressions of external objects would be communicated, at the places of union, to other nerves than those affected; and the change produced by the will in any nerve, at its origin in the brain or spinal marrow, in order for moving a particular muscle, would affect all those nerves with which it has any communication by means of the *ganglia* or otherwise. Thirdly, We observe a remarkable sympathy between many parts whose nerves have certainly not the *smallest communication with one another*."

After a variety of arguments, all having the same tendency as the foregoing, this author comes to the following conclusion:—"If, therefore, the various instances of sympathy cannot be accounted for from any union or *anastomosis* of the nerves in their way from the brain to the several organs; and if there are many remarkable instances of consent between parts whose nerves have no connection at all; *it follows, that all sympathy* must be referred to the *brain* and *spinal marrow*, the source of all the nerves." This was rather a summary conclusion—

however, nearly the same doctrine is now advocated by Dr. Marshall Hall, who denies, in toto, that the nerves unite or anastomose by any means, or in any part of the system; also the existence of *a* sympathetic nerve; and refers the various sympathies to the spinal marrow and medulla oblongata. Professor Whytt further adds:—"Although the optic nerves unite at the cella turcica, yet it has been shown that their fibres do not cross, intermix, or truly communicate with each other; nevertheless there is a considerable sympathy between the eyes." Again he says, "Although the nerves of the two kidneys do not appear to have any connection with each other, yet, when one of these glands is inflamed or irritated by a stone, the secretion from the other is frequently much diminished."

As the foregoing dogmas are not in exact accordance with my views of the same subject, I shall take the liberty of making the following comments upon them—First, With regard to the "*individual nerves.*" In the extremities of the body we certainly find nerves arising from the same source travelling together for some way, then separating, and finally meeting and interlacing with each other, if not actually uniting. In the arm we have a good example of this; and in the thigh another between the branches of the anterior crural and great sciatic nerves. It is true that both of these nerves do not

arise from the same point; but then the ganglia from which they take their origin communicate with each other; and I have been enabled to trace a close connection between some of the minute branches on the inside of the thigh. Second, As to the arguments against the *ganglionic* nerves anastomosing with each other, I cannot at all concur; and whatever doubts may exist with regard to the former, it appears to me that there are few, if any, in this instance. In the cavernous sinus in the brain, we find the ophthalmic branch of the fifth, (a ganglionic nerve,) together with the third, fourth, and sixth pairs, more or less connected with that branch of the sympathetic which accompanies them. Some anatomists go so far as to state, that the sympathetic itself has its origin from the fifth pair, from its vidian branch; but this view is not generally received. That there is an evident connection between these two nerves does not admit of doubt; and this we may infer forms a link within the cranium between a *complex nerve*, and one *purely* involuntary. As we descend, we may observe in the neck, between the cervical plexus, sympathetic, and eighth pair, a communication that is not "*deceptive;*" and although their union is certainly "intricate" enough, still it may be clearly demonstrated that their communicating or anastomosing branches cannot be *separated* from each other without injury to either; or, in other words, without a solution of continuity

being produced. The followers of Whytt would call this nervous connection merely a *relationship*, and not a *bona fide* union.

In another Chapter I have alluded to the thoracic ganglia of the sympathetic situated on the heads of the ribs, sometimes twelve, and sometimes only eleven, in number; we may see that each ganglion communicates with the *spinal* intercostal nerves by one or more branches—that these ganglia send off filaments to *unite* with the laryngeal, phrenic, and vagus nerves; and who will deny that palpable *anastomoses* that exists in the immediate vicinity of the heart between the cardiac plexus, eighth pair, and recurrent nerves? Again, on the diaphragm we see a communication between filaments of the sympathetic and vagus; and finally, in the region of the stomach, in the *solar plexus*, there is an evident *anastomosis* of branches derived from these two great nerves. From these data I argue that there is a "*nervous circle*" between the brain, sensorium, and ganglionic nerves, as far as I have traced them, with which the kidneys, bladder, spermatic organs, &c., are connected through the medium of the *renal plexus*, spinal, and splanchnic nerves.

I here take the opportunity of stating my dissent from some of Dr. Marshall Hall's views regarding the sympathetic nerve. Dr. Hall is of opinion that the word sympathetic is an "unmeaning

term," as applied to this nerve; and again he says in his "Lectures on the Nervous System," "I proceed to notice the *internal* ganglionic, or that designated the grand sympathetic, from an *erroneous* notion that upon it depended the extensive series of sympathetic actions which I have shown to be functions of the true spinal or excito-motory system." That the animal or instinctive passions are materially connected with the spinal system, I have not the slightest doubt; it is apparently their seat, their prime mover. But with regard to any of those emotions not exhibited by the lower animals, (of which the impulse that excites the blush is one of the best examples,) I must say it is my firm conviction that they have not the slightest connection *directly* with the spinal marrow, and if this organ becomes implicated in the internal commotion, it is not from any connection with this emotion in itself; its implication is merely secondary, and takes place most probably by the radiation of the general and *sympathetic* sensation. I am fully impressed with the ingenuity of Dr. Hall's beautiful theory of the reflex functions of the spinal marrow and its nerves; but reflected movements of the nervous principle are not *confined* to this part of the nervous system; it is now well ascertained that reflex motions take place in the sympathetic nerves, as well as in the true spinal system, differing only in the degrees of intensity. Dr. Hall, I believe, arranges the emo-

tion of blushing with the other exciting impulses, as those of anger, fear, &c. whose seat he places in the medulla oblongata, but with this opinion likewise I have to differ; and I am sure others will agree with me in this respect, for if there be any *cerebral* emotions, this surely is one;—as well might he place the seat of the soul or of the *conscience* in the spinal marrow with that of the passions, as to conclude that the impulse which excites the blush, emanated from that part of the nervous system. I do not think that the sympathetic and its functions are deserving of the neglect and *oblivion* which Dr. Hall would consign them to. But of this I shall speak more fully in a succeeding Chapter:—and now let us return to the doctrines of Whytt and his followers.

With regard to the "sympathy observed between parts whose nerves have certainly not the smallest communication with one another," I have merely to state, it is my firm belief, that there is no instance in the animal economy wherein such sympathies are observed, which cannot be traced to nervous communication.

As to the idea, "that a *confusion* in our sensation, as well as in the motion of our several muscles, would be the necessary result of an anastomosis of the nerves," experience proves that it is not exactly correct. It is strange that this writer, who so readily referred all sympathetic emotions, not to

any connection or union between the nerves, "but to *particular sensations excited in certain organs*," could not suppose that there were certain nerves constituted for the conveyance of *certain impressions*, and the performance of *special functions*—surely one supposition is as reasonable as the other; and it does not at all follow, that an individual nerve conveying an impression to or from the brain must, as a matter of course, transmit part of its impression to every nerve with which it may communicate in its course, and through them to the particular organ to which they are finally distributed. If such were the case, it would, indeed, be contrary to all the laws hitherto observed in Nature's works.

In denying that anastomoses of the nerves had any thing to do with the production of sympathy, Professor Whytt had in view that the brain and spinal marrow were exclusively the organs to which all sympathetic actions were to be finally referred, and in this he was partly correct; but then it was not necessary to disprove the former doctrine, in order to assert this opinion; for, admitting that the brain, &c., be the true *source* of sympathy, the ganglionic and some of the cerebral nerves perform an important part in the nervous chain, by conducting the sensorial impulse from the brain to the different *vital* organs, as the heart, stomach, &c., in order that they may sympathize with the part first affected, which impulse we may reason-

ably infer is carried on to the parts first mentioned by means of an *anastomosis* of the *cerebro-spinal* nerves.

To the sympathy of the various organs with the *mental emotions*, this assertion particularly applies. Thus, in weeping from sorrow, several *involuntary acts of deglutition* take place. This is the peculiar feeling which has been so expressively denominated the "*stifling of grief*," and it affords a fine illustration of a reflex sympathy. The œsophageal plexuses of nerves are particularly implicated in this instance, and it is to be borne in mind that to this net-work of nerves are sent branches of the sympathetic, vagus, and recurrents.

This writer was one of the first who strenuously opposed the doctrine of the nervous *laquei*, as advanced by Willis, Vieussens, Haller, &c., who supposed that the sudden changes in the motion of the fluids, caused by the passions, were owing to the arteries and veins being compressed or contracted by the nerves, which are seen in many parts of the body to surround them like small cords. It was with this view Willis laid such stress on the following remark:—"Poterat nervus arteriam tanquam circumjectus funiculus arctare;" and Haller, when treating of the nervous tissue, alludes to the curious manner in which the vessels are encircled by nerves; he says, "Eas enim omnes arterias, aut ansa nervosa aut multiplex utique nervorum plexus amplec-

titur." But as we are now aware that the nerves are not muscular in any sense of the word, that they are the least elastic parts of the body; that in their natural state they lie loose in the cellular substance, and even experiments prove that they are wholly incapable of any contraction whatsoever; this doctrine is entirely exploded. However, although the nerves do not contract on the arteries, and by this means propel the blood in the small vessels; still, I believe, that they exert a *propelling influence* on the capillaries, which they indubitably possess, though in a very different manner from the above.

I have already stated that the mucous membrane of the intestines, and that of other parts, and the arteries, are principally supplied by the sympathetic nerves. We know that the motion of the intestines is *peristaltic* or *vermicular*, in short, that this is a peculiar property of the sympathetic nerves, which it seems from recent researches on this subject, they impart in a greater or less degree to those organs which they supply exclusively with nervous influence. Now, by entwining the remote vessels in this spiral-shaped manner, the nervous filaments of the sympathetic, may, by imparting to them their vermicular influence, produce a similar movement in the blood current within; hence we may in one way explain the rotatory motion of the red globules, as seen in the capillaries of the frog's foot, &c.; and by this spiral arrangement, the nervous

principle would extend over a larger surface of the blood-vessel—its vermicular current would exert a powerful influence over the motion of the blood, in consequence of its being conveyed *around* the tube; and, hence, in the excitement of passion, in the blush of shame, &c., we might account for the instantaneous penetration of the capillaries of the head, neck, and face, with red blood, independent of the heart's action. This latter assertion does not at all interfere with one previously made regarding "the heart having the power of transmitting the blood through the capillaries," in this instance, the redness is produced by nervous influence on the small vessels, the heart itself being sympathetically engaged at the same time.

Nothing makes more sudden or more surprising changes in the body, than the several passions of the mind. These, however, act solely by the mediation of the brain, and exhibit, in a strong light, its sympathy with every part of the system.

"Such is the constitution of the animal frame," says Whytt, "that certain ideas or affections excited in the mind are always accompanied with corresponding motions or feelings in the body; and these are owing to some change made in the brain and nerves, by the mind (SOUL) or sentient principle; but what that change is, or how it produces those effects, we know not;—as little can we tell why

shame should raise a *heat and redness* in the face, while fear is attended with a paleness."

Before mentioning this writer's theory as to the manner in which the blush is produced on the cheek, I must premise by stating, that according to his view of the capillary circulation, the very small vessels were endowed with *a power of motion* excited by the *stimulus* of the fluids as they passed along; and that the "vibratory" or "oscillatory" motions of these vessels were much encreased, when they were more than ordinarily irritated; or when through violent passions, or other causes, the nerves were greatly affected. Upon the same principle he explains the phenomenon of blushing, and in the following words:—"The *redness* and glow of the face from a sense of *shame* are most probably owing to an encreased motion of the small arteries of that part; for the florid colour and sudden warmth seem to be more the consequences of a quicker motion of the blood in these vessels, than a stagnation of it from any compression or spasm of the veins, which would produce but a livid redness and less heat. Besides, we know that a greater degree of redness is instantly brought on the eyes, and in a short time on the skin by an encreased motion of their small vessels, upon the application of acrid substances to them."

As the doctrine of "the encreased motion of the small vessels" has long since passed away, this

theory of the Mechanism of Blushing necessarily falls to the ground; we must therefore endeavour to seek its explanation from some other source than the foregoing. My motives for directing so much attention to Professor Whytt's book, were in consequence of his making more frequent allusions to this subject, and to other of the sympathies, than any other writers, (excepting Van Swietan) that I am aware of, who lived in the eighteenth century. I shall now state Professor Muller's observations on this phenomenon, as being the most modern, and in opposition to the former.

In the first place, this profound physiologist does not deny that some of the nerves anastomose with each other, and in this respect differs materially from Whytt and his disciples. He is of opinion, that the phenomenon is entirely local, that is, is produced independently of the heart's action; but at the same time he does not deny that the heart and other vital organs sympathize with the mental or sensorial impression which calls forth the blush. Muller supposes that there is a mutual action or affinity between the blood and the tissues of the body, which under many circumstances becomes greatly increased, as exemplified in the numerous instances of "vital turgescence of the blood-vessels," such as happens in the antlers of the stag when growing, the orgasm of the uterus during pregnancy, the comb of the turkey-cock when enraged, &c.,

and "this condition," he adds, "may be excited, as in *blushing*."

He denies the existence of a self-propelling power in the blood, and further states "that it is most probable the nerves do not really assist in carrying on the circulation in the capillaries, *although it is certain* that nervous influence is the principal cause of the accumulation of blood in the capillaries of *certain parts* during the state of vital turgescence."

Professor Muller again illustrates this vital affinity of parts, by referring to the vegetable kingdom. He says, "This condition of turgescence in animals is analogous to phenomena which are so evident in plants, such as the afflux of sap to the fruit-bud, which contains the impregnated ovum."—But he adds, "although the *circulation* of the sap in plants, effected by *means of attraction*, shows us the possibility of a similar phenomenon in animals; still there are at present no distinct observations which prove it in a conclusive manner."* This latter statement does not refer to what he calls the vital turgescence, it merely has relation to the *ordinary* mode of circulation as observed both in plants and animals.

Professor Muller makes the following interesting

* Physiology by Baly, p. 233.

remarks on the anastomosing of the facial nerve or *nerve* of *expression* of the human countenance, with the trigeminus or fifth, and vagus, both of which are ganglionic nerves.

Sir Charles Bell imagined that certain muscles of the face, for example those of the lips and nostrils, might lose their powers of motion in the expression of the passions, but might still perform their part in the movements of mastication and *vice versa*, and he explained this by the circumstance of these muscles receiving branches both from the facial and infra-orbital nerve. "But the latter nerves," says Muller, "has not the slightest motor power, and the muscles of the face are, by division of the facial nerve, rendered incapable of any kind of motion. * * * Sir C. Bell regarded the facial nerve as motor only, but it is also highly sensitive. The sensibility of this nerve is indubitable, but whether its sensitive fibres are contained in the nerve itself from its origin, (according to Eschricht's view,) or superadded to it in its numerous anastomoses with the fifth nerve, viz., with the superficial temporal, subcutaneous malæ, infra-orbital, and mental branches, is another question. Eschricht's experiments have at all events proved that the facial nerve does not derive all its sensitive fibres from the nervus trigeminus."

After noticing the views of other physiologists on this subject not coinciding with his own, he goes

on to state—"The source can be distinctly shown from which the facial nerve derives the sensibility which it still retains at its exit from the stylo-mastoid foramen, when the trunk of the nervous trigeminus is divided—a branch of the vagus, namely, unites with the facial nerve in its course through the Fallopian aqueduct; this communicating branch of the vagus which exists in man, as well as in animals, and which completely explains all difficulties, was first discovered by Comparetti, and has been also described by Cuvier in the calf. A considerable branch is given off from the vagus at an acute angle, and passes through a special bony canal to the *facial nerve*, with which a portion of its filaments *unites;* while the continuation of the branch is distributed to the ear. This nerve which we have seen in the calf, as well as in the human subject, is evidently a principal cause of the *sensibility* of the facial nerve."

With regard to the anastomosing branches between the ganglionic and the trunks of the cerebral and spinal nerves, Professor Muller observes—It being shown that the sympathetic regularly receives fasciculi of motor and sensitive fibres from the spinal nerves as its motor and sensitive roots, the existence of a similar relation between it and those cerebral nerves which are analogous to the spinal nerves, in having double roots, becomes very probable. The hypoglossal, vagus, and glossopharyngeal nerves

do, in fact, give roots to the superior cervical ganglion, and thus to the cord of the sympathetic; * * * The sympathetic nerve then receives roots of sensitive and motor properties from the cerebral nerves which we have named; it, likewise, receives a similar root from the great spinal nerve of the head—the nervus trigeminus (or fifth)."

Such are a few of the observations of this profound writer on the communications of the nervous branches with each other in different parts of the body; and what other cause can we assign for this union between nerves, oftentimes different, not only in structure, but likewise in the functions they have to perform, more probable than that it is for the sole purpose of transmitting the nervous principle from the one to the other as occasion may require, thereby diffusing their influence over a wider space, and from one organ to another, as happens, apparently, during the different emotions of the mind? Professor Muller is opposed to the doctrine of the nervous principle and electricity being identical—and his views differ entirely from the conclusions of Dr. Wilson Philip and those of MM. Prevost and Dumas on this subject. The last-named physiologists, in particular, have endeavoured, by experimental enquiry, to prove the presence of electric currents in the nerves; but Muller objects to the manner in which the experiments were conducted.

M. Bouillaud read a memoir by M. Folchi, before

the Académie Royale de Médecine, in May, 1838, in which the author endeavoured to demonstrate the existence of an electric current emanating from the brain, and passing through the nerves to the different parts of the body, which he believed identical with the nervous current. This gave rise to a discussion regarding the correctness of the experiments which led the author to the above conclusion, but nothing was finally determined either one way or the other; and the author himself not being present, his theory could not be so fully explained and supported as was required.

CHAPTER III.

A THEORY OF THE MECHANISM OF BLUSHING.

It is now almost universally admitted that all the impressions which excite the feelings are *first* received by the sensorium in the brain. The mind reflects and generates the ideas which form this impression, and these *ideas* are instantaneously transmitted to the true seat of the passions, wherever that may be; whether in the medulla oblongata, as is the opinion of Dr. M. Hall, or in the viscera, according to the ancients, as before mentioned. Here a question presents itself for our consideration, viz.—Does the phenomenon of blushing come under the head of the "*passions*," commonly so called—or, in other words, is it the *effect* of passion? According to my view, it is evidently most distinct from what we understand by the term—it is "moral" or "spiritual," not animal; and when we speak of it, in relation to *the* passions, we should affix to it either of the foregoing prenomens in contradistinction to those common to us with the brute.

Blushing cannot be excited by *physical* means—not so with the passions. We can make an individual laugh against his will, by tickling the soles of his feet—we can make him cry by corporal punishment—we can make him tremble with fear by the same means—we can rouse his anger by striking him—but, we can only make him blush by appealing to his conscience. No physical means can produce this phenomenon—it must be solely a moral stimulus that will excite a true blush—an appeal from the being spiritual, from the "*divinity which stirs within us*," to the organic sensibility of other vital parts of our system, which readily sympathize with the soul's emotion in giving external evidence, by the tint of the cheek, of what is going on internally in the *moral sanctuary;* and, what other evidence could be more eloquent than that which comes *gushing* from the heart? It speaks volumes—we all intuitively know that its presence is the result of a painful struggle in the mental feelings.

If it be *true* that the face of Charlotte Corday, the assassin of Marat, who was executed during the French Revolution, became suffused with a blush *after* the head was severed from the body, we may infer that the stimulus which excites the blush has a higher or more elevated origin than that assigned to the animal or instinctive passions; but, I fear, little reliance can be placed on this statement, unless, reasoning from the circumstance of the

heart's possessing its organic vitality for some time after being removed from the body, (by means of the twigs of the sympathetic nerve diffused through its substance, as already mentioned, and even then being susceptible of impressions,) we were to draw the extravagant conclusion that the minute filaments of the same organic nerve detected by Reil and others on the surface of the brain, not only possessed their vitality after decapitation, but also maintained that of the organ over which they were scattered, and during this period rendered *it* liable to *moral* impressions, as well as the heart to *physical;* but before such a theory could have any probability in Charlotte Corday's case, we should presuppose that the *sensorium also* survives for some time after the head being severed from the body; that the *conscience* still actually *exists*, and as the capillaries of the face as well as those of other parts of the system are supplied by and under the influence of the sympathetic nerves, we were to infer that the sensorial influence in this instance, as during life, was conveyed from the brain to the cheek through this channel. But it will be observed that there are many serious obstacles in the way of such an inference. In the first place, the analogy is imperfect, and for obvious reasons—the heart being composed of muscular fibre, the brain of nervous matter—the functions of the latter being spiritual, those of the former purely physical—the sympathetic filaments *receiving* influence

from the brain, not bestowing it upon this organ—and lastly, for aught we know to the contrary, the sensorium does not, even for a moment, survive the death of the body. It is true that vitality displays itself strikingly in the eel and salamander after being divided into several parts, and for some time in each division. These parts retain their organic sensibility, which may be excited by any stimulus; but as this property is not possessed by the higher animals, it would be hazarding too much to suppose that the brain of man retained, though in a less palpable manner, its susceptibility of impressions also, for some time after being separated from the body.

It will appear from the foregoing that I have endeavoured to draw a distinction between blushing and the passions, of the existence of which I am perfectly convinced, and if we use the word *passion* to express the excitement which produces this phenomenon, we should call it a *moral passion*, to distinguish it from the others.

In a former page I have alluded to a "*nervous circle*," through which it is probable that the sensorial influence is circulated in the act of blushing. I shall now endeavour to describe that circle. The brain is the centre or rather the origin of this circle, as the heart is that of the circulation. The heart propels the blood-current through the system. So

the brain, in this instance, is the exciter—the *primum mobile* in the circulation of the nervous current around the periphery above mentioned. The brain being the exciter, the ganglionic nerves, and some of the cerebral, are the conductors of the nervous current.

The sympathetic nerve, as we are all aware, extends from the brain through the skull, along the vertebræ of the neck, chest, and abdomen, to terminate on the coccyx in the ganglion *impar*. In its course from the brain to its termination, we find it communicating with a vast number of nervous branches derived from various sources. In tracing this nerve from above downwards, we find it communicating in the *cavernous sinus* with a branch of the fifth pair, and accompanying the third, fourth, and sixth pairs, through it. It is also connected with the *vidian* so intimately that it has been supposed by some, as already observed, to take its origin from this nerve. In the ciliary nerves arising from the *ciliary* or *lenticular ganglion*, we have an association of branches from the organic or sympathetic nerve with the third and fifth pairs. The same occurs in the *gasserian ganglion*. Again in the *spheno palatine ganglion* we have an interweaving of branches between the sympathetic and nervus trigeminus; the fifth pair likewise communicates with organic filaments derived from the *otic* ganglion or plexus *santorini*. There is a connexion be-

tween the sympathetic and glosso-pharyngeal nerves, at the point where the ganglion-petrosum is formed, and with the *facial* nerve at the situation of its enlargement within the Fallopian tube, which Muller supposes to be for the purpose of adding *organic* fibres to these nerves. Tracing onwards, we find this great nerve, after leaving the cranium, communicating freely with the spinal nerves, and according to the opinion of Remak, the cords of communication consist principally of *tubular* fibres; there is also a regular interchange of filaments between the sympathetic and intercostal branches. In another part of this Essay, I have discussed the connection that exists in the neck and thorax, between the vagus, recurrent phrenic, and sympathetic nerves, and if we include that union just described between branches of the trigeminus (within the cranium) and sympathetic, we shall have through the links of this nervous chain the brain, *eye*, heart, lung, liver, and stomach united into one harmonious whole, by means of which an impression on one of these organs may be conveyed to, and felt by the rest. Immediately after leaving the chest, we find the great sympathetic nerve of *either* side uniting behind the stomach, and the result of this union is the solar plexus of nerves, before described; which plexus or ganglion completes or forms the lower boundary of that *nervous circle* I have been describing.

This circle is in a manner doubled by the vagus nerve of each side, pursuing a nearly parallel course as far as the stomach. Now, fibrillæ of the sympathetic have been described by Reil as seen by himself and others on the surface of the brain; but some have doubted this assertion. However, this much is certain, that the branches of the internal carotid supplying the cerebral mass are, like all the other arterial tubes in the economy, supplied by filaments of the organic nerves, and as the capillary blood-vessels traversing the brain inosculate with each other like those of different parts of the system, we must infer that their accompanying nervous fibrillæ anastomose, or at least interweave, with each other in a somewhat similar manner. According to this view we may explain the closing of the nervous circle within the cranium. The superior union of this circle cannot, like the inferior or epigastric, be brought to a defined point; on the contrary, the union that takes place within the cranium between the sympathetic nerves is not confined to one or two large branches, but is formed by the uniting of a variety of small filaments through the substance of the brain. Then, from the numerous fibrillæ diffused through the cerebral mass, we are to infer that the cord of the sympathetic takes its origin, and that this origin is common to both nerves, the result of which is a union of them within the cranium.

After leaving the skull, we find the sympathetic

of each side passing down along the spinal column internally, and forming on each vertebra, near its junction with the head of the rib, a ganglion, which, as we have already seen, communicates with branches of the spinal nerves. All these ganglia are linked together by the parent trunk, and have been supposed by some writers to perform the office of *insulators* for the nervous current transmitted from the brain. According to the hypothesis of Reil, "these ganglia have the nature of half-conductors, preventing the transmission of *weak* impressions, and allowing the transmission of such only as are the effects of very intense irritation." Some observations made by Brachet relative to the effects of irritation of the thoracic ganglia of the smpathetic, favour this view.* In traversing the thoracic cavity, this great nerve gives off near the sixth and seventh dorsal vertebræ, the great splanchnic branches which unite into one trunk before leaving the chest, and having entered the abdomen expand into the semilunar ganglion. The *lesser* splanchnic are given off low down in the thorax and terminate in the *renal plexus*, from which, organic nervous filaments are transmitted to the reproductive organs, bladder, &c. From the circumference of this nervous circle, organic branches anastomose with spinal and cerebral nerves, so that

* Muller's Physiology, p. 662, etc.

through the radiation of the sympathetic filaments from this centre to different parts, their involuntary influence is almost universally diffused over the vital organs of the thoracic cavity. In the abdomen, the stomach, it is true, is supplied by the par vagum, but the functions of this cerebral nerve are highly complex, (as has been lately so well described by Dr. J. Reid,) and no doubt much of its complexity, involuntary, and organic influence is derived from its intimate connexion with the spinal and *particularly* with the sympathetic nerves.

The opinion of Van Deen on this subject is, that the communications of the ganglionic with the cerebro-spinal nerves are for the purpose of imparting to the latter a vegetative influence in addition to their sensitive and motor properties; and to the ganglionic nerve a motor influence, and also the faculty of *sensibility* to *impressions under certain circumstances.* This statement was published in 1834; and shortly afterwards, in the same year, Professor Muller promulgated a directly opposite opinion. The latter writer states his conviction that the commonly received notions respecting the connections of the ganglionic with other nerves, namely—the transmission of sympathetic influences, are erroneous. For my part, I must say that I am inclined to the former opinion. But to proceed—

It will be remembered, that the nervous circle I have traced from the brain to the solar plexus was

principally formed by the sympathetic nerves of either side, uniting above and below. Now, it has been demonstrated, from experimental enquiry, that the sensibility of parts supplied by the sympathetics is more feeble and indistinct than in other parts; and it was this peculiarity that drew from Reil the hypothesis that the ganglia have the nature of half-conductors, and only transmit the impulse of intense irritation. This opinion appears to me to be more correct than any other, especially when the *mind* is the impelling organ, and the reason why, I shall presently explain.

In other than the organic nerves, the velocity with which the nervous fluid is circulated, has been calculated by Haller at the rate of 9000 feet in a minute, and by Sauvages at 32,400 in the same space of time. These conclusions were drawn from the rapidity with which electricity is transmitted through conductors; the galvanic and nervous principle being regarded by many as identical; thus we find Mr. Mansford explaining the nature of the epileptic fit on this principle—he contended that the brain is constantly generating the nervous fluids, and that in health they are controlled by the will, in *opposition* to their *natural tendencies*; their formation, retention, and discharge thereby being duly regulated; but, when *weakened* by *disease*, this *control* is *irregularly* or *imperfectly* exercised, and their

accumulation is favoured, until it reaches its maximum, when it explodes in an epileptic seizure. However, most of the modern writers on Physiology deny the identity of nervous influence with the electricities. Dr. Shearman contends that epilepsy owes its origin to a deficiency or irregular distribution of *nervous energy;* and Dr. Copland states that in some cases the irritation is propagated by *nervous connections* to the situation referred to, the chief phenomenon of the seizure being one of the numerous forms of morbid action depending upon *reflex sympathy*. The *aura epileptica* is, in many cases, nothing else than a manifestation of this kind of sympathy.*

Although the sympathetic nerve is the predominant feature in the formation of the *circle* above described, it is also to be borne in mind, that the eighth pair or par vagum with which the former is so intimately connected, pursues a nearly parallel course from its exit from the cranium as far as the stomach, and that in this course both sympathetic and vagus have frequent and close communication with the true spinal nerves. This connection must be undoubtedly for the purpose of a mutual transmission of their respective nervous energy. What other motive can be assigned for this blending together of different nerves?

* Copland's Dictionary of Practical Medicine, pp. 797, 798. Article—EPILEPSY.

The vagus nerve, in many animals, has been proved by Professor Weber to supply the place of the sympathetic. This is the case in the snake. Then from the circumstance of these two nerves mutually replacing each other, we may fairly argue that the function of the one may be performed by the other in such instances. This is another fact in proof of the intimacy of their relationship, and of their imparting nervous influence of a similar kind to each other.

The probability of a *circulation* of the nervous fluid from the brain through the nerves, and back again to the central organ, is denied by Professor Muller in his elaborate work on physiology, and as it is upon the belief of the existence of a nervous current circulating through the cerebro-spinal and ganglionic nerves to and from the central organs, that my theory of the mechanism of blushing is founded, I with much diffidence have to differ from the opinion of this great physiologist. "It cannot be proved," says this writer, "that the centripetal and centrifugal conductors form a *continuous circle* in which a constant current of the nervous fluid is kept up from the central organs, through the motor nerves, and from the peripheral extremities of these back through the sensitive nerves to the central organs." In favour of this view he cites the experiments of Gaedechens, in which irritation excited in the facial nerve was not communicated by means of its anas-

tomosis to the trunk of the infra-orbital nerve, so as to excite pain. Moreover, he denies the existence of a "real communication between the primitive fibres of both these nerves." I look upon these merely as negative proofs in favour of his doctrine, but for the present, it is with the ganglionic * and cerebro-spinal anastomosing that I have principally to do, and the following are my views regarding the connection and function of these two nerves :—

First, That the sympathetic nerves, contrary to the opinion of Bichât, are sensitive, though in a minor degree, but their sensibility may be considerably increased on certain occasions, through the agency of their ally, the par vagum, the latter nerve affording a sensitive influence, as is well known, to all the parts with which it communicates. Secondly, That there is every reason to suppose that even in these nerves there are motor and sensitive fibres, independent of others for nutrition. Thirdly, That the fibres of this nerve can communicate their action to each other, and that the nervous fluid can circulate or oscillate through them in both directions, that is, from the central organ to their extreme filaments, and *vice versa*. And lastly, That the impulse of the *Moral Feelings*, when excited, is transmitted through the sympathetic and vagus, from the sensorium to the different organs that participate in

* The word ganglionic is here applied to the SYMPATHETIC Nerves in particular.

the MENTAL EMOTION; for example, in the flush of hope and the joy of *its* emotion, the heart and stomach sympathize with the mind, and their functions harmonize with each other—the individual feels an indescribable lightness and vigour of body, together with a buoyancy of spirits, while exulting in the delightful enjoyment of the "*pleasures of hope;*" and no doubt the impression of the mind is conveyed to the organs mentioned, through the medium of the ganglionic nerves, and the healthy impulse thus conveyed to the heart and stomach is reflected again upon its original fountain. Thus a mutual feeling or consent is carried on between the whole.

It is upon these principles, then, that I explain the *Mechanism of Blushing*, and the *radiation* of *sensations* that are generally felt from the impulse of shame. The following is the *theory* advanced regarding the production of these phenomena:—

The exciting impression is first received by the sensorium, which physiologists now admit to be situated in the brain, the *mind* reflects upon the nature of the exciting *cause*—a train of ideas is generated and passed in review before the reflecting faculties (the *mind's eye*). The *conscience* becomes roused, and the impression first conveyed to the sensorium is now submitted to it for final judgment; it is here weighed in the balance (I am speaking of the true blush—the blush of shame). If the

mind be susceptible, and if the memory recals and brings before the sensorium the recollection of past circumstances inimical to the moral feelings, and perceives in them an identity with the present; or if the *conscience* itself sees in the exciting impression conveyed to the sensorium at first, a just evidence of an infringement upon the laws of morality, it *repels* the impression, and promulgates to the different *vital* organs in the system its own feelings. Thus the chain of action is set up which is finally to bring forth the blush on the cheek.

But if the first impression be feeble, so as only to excite a partial emotion in the mental faculties, (as takes place in those instances of *suppressed* blushing, where the individual experiences all the *preliminary sensations;* but still the impulse is not sufficient to produce the phenomenon,) the cheek will not become suffused. When the appeal to the *conscience* preponderates (the infringement on the moral and social laws being weighed in the balance) the individual concerned is perfectly aware, even some moments before-hand, of what is about to take place—*volition* is now forcibly called into action, and strenuously endeavours to avert the threatened and painful exposé of the CONSCIENCE and its feelings. It is in vain that the *will* struggles against the combined power of the mental faculties—nay, the very attempt to suppress the exciting impulse only adds new vigour to its involuntary movement, by re-

taining the impression still before the sensorium and conscience, which the latter indignantly endeavour to disclose, and finally succeed in transmitting their own impression to the different organs that sympathize with them during the production of the phenomenon—it is the diffusion or propagation of this sympathetic influence that I now come to investigate—

In the first place—What are the organs affected during the impulse of shame? There are three in particular, viz.—the brain, heart, and stomach; and if the blush be intense, and the individual sanguineous in temperament, the corpora cavernosa, as before mentioned, are liable to arterial injection. Is it not interesting to reflect on the mechanism by which all these different and widely separated parts are united together in *one common cause*, each participating in the feeling of the other, and by their combined efforts rendering the individual painfully alive to their general, though momentary derangement, and the internal emotion about to be proclaimed upon the cheek?

This sympathetic excitation of the vital organs takes place, and the person concerned is perfectly conscious of its progress several moments *before* the struggle of the internal feelings is proclaimed on the cheek. Query—Is not this contrary to the generally received opinion, that all the emotions are proclaimed *instantaneously*—that even their

generation and physical development or proclamation are synchronous, no interval existing between them; and how do we account for the *delay* which we allege takes place in this instance, viz., from the first sensation of the blush-exciting impulse, until the phenomenon is fully brought forth?

These querys, I think, may be satisfactorily answered by the following explanation. That the *interval* above mentioned, between the first internal sensation and the final result the suffusion of the cheek exists, does not admit of doubt, and this very interval caused by the *slow** movement of the sensorial impulse to the epigastric region, solar plexus, stomach, &c., which are decidedly effected by the emotion, brings most convincing evidence that the nervous influence sympathetically exciting those parts is principally transmitted from the brain through the medium of the *ganglionic* or *sympathetic* nerves, the slow transmission of impressions being (as we have already seen) peculiar to this division of the nervous system, which Reil endeavours to explain by the *insulating* properties of the

* When I say, that the movement of the nervous principle is SLOW in this particular instance, I am to be understood as using the term in a limited sense only. Experiments have proved that the VIS NERVOSA does not travel so fast through the sympathetic as through nerves purely sensitive, and whatever may be the EXTERNAL appearance of the progress of the blush the INTERNAL, or nervous movement is by no means so rapid, as at first sight it would lead us to suppose.

ganglia it forms along its course. The vagus nerve is materially implicated, as far as the stomach is concerned, and also receives and transmits impressions to and from the great sympathetic, according to the predominancy of their influence. But, to proceed—

When the feelings are excited strongly, be it from shame or bashfulness, the *nervous balance* is lost in the cerebrum, and the involuntary powers of the mind gain the ascendancy over the *will*, and the agents of its volition. The first impression is decidedly made on the sensorium, on the *mens conscia recti,* and affects it in some peculiar manner, the remote cause of which we are not as yet aware. The impulse given to the brain is now conducted thence, in a comparatively slow degree, by the sympathetic *circle* along the thoracic cavity to the heart, stomach, and solar ganglion. The stomach in particular is peculiarly influenced by the nervous circulation, which is, perhaps, owing to its vicinity to the union of the semilunar ganglia, independent of the impression conveyed to it by the par vagum or eighth pair.

It is here that indescribable sensation is perceived, which immediately precedes the blush, and that, as it were, gives the first alarm which produces the irresistible *drooping* of the entire countenance, just as the *colour* is beginning to rise upon the cheek; at the same time there is a fluttering sensation felt

about the heart, and there seems to be a kind of momentary stagnation of the nervous influence in the præcordial region while these anomalous feelings are being excited; it is, therefore, with strict accuracy, that John Hunter has applied to this part the expressive designation of the "*centre of sympathies.*"

At the epigastric centre the nervous impulse or *spiritus cerebri*, as Boerhaave terms it, seems to pause —Donec aptus evadat fluere per vascula ultrâ imaginationem parva omnia,"* that is, until by repeated impressions from the sensorium, it becomes, as it were, overcharged with feeling, when suddenly there is an indescribable sensation of *relief* perceived by the individual, as if an oppressive burden was removed. The partially restrained respiration becomes free again, which is announced by an almost imperceptible *sigh*, and *now* a peculiar glow is felt over this region, which is perceived gradually rising from the præcordia, not unlike the *epileptic aura*, through the chest and neck; an involuntary act of deglutition ensues, the heart still sympathising in the general emotion, and at length the flash bursts forth upon the cheek in a "living blaze of blood"—*it is the lava of the heart produced by an eruption of feeling*, now rolling through myriads of minute vessels that were hitherto invisible in the cheek.

* Institutiones Medicæ, pp. 276, 277, et seq.

This part which I have attempted to describe is but the first movement in the mechanism of blushing. After the colour rises and spreads over the surface of the cheek, it is retained there generally for a few moments, oftentimes for several minutes, being regulated, and entirely dependent on the impetus of the soul's emotion; when the interval of time mentioned has elapsed, the blush begins gradually to subside, and the manner and progress of its decline is not less interesting than that of its first production. But after the first *visible* declension of colour in the cheek, should any thought or expression again jar upon the conscience or sensibility, the same chain of action is again set up; the same impulse is again transmitted through the nervous circle; the same organs sympathize anew in the mental emotion, and blush follows blush, each deeper than the other, as often as the impression is repeated in the sensorium. The varying aspect, which this waving or oscillation of colour, produces in the human countenance is truly wonderful—it forcibly proclaims the intensity of the *internal* eruption; and the design made manifest in every movement of the beautiful machinery which can produce these physical changes so rapidly in the human face, must convince every reflecting mind of the *existence* of a *wise* and *bountiful Omnipotent*.

The red colour varies considerably in its shade

during the progress of the blush; when it first rises to the surface it is of a much *deeper* colour than after it has been visible for some moments; immediately before it begins to decline the cheek assumes a perfectly *scarlet colour*, which must be owing to the blood being *aereated* at the surface, from its great proximity to the external atmosphere. If venous blood can be oxygenated when enclosed in a bladder for experiment sake, assuredly it may undergo the same process when placed beneath the delicate epidermis of the cheek.

As yet I have not offered an explanation as to the manner by which the corpora cavernosa become implicated during the emotion. The following is my view regarding the mechanism and probable cause of this extraordinary coincidence of vital turgescence.

At first sight, this fact would seem to disprove my assertion—that the phenomenon of blushing is entirely the result of a *moral* impulse, emanating from those faculties in the *cerebrum* which govern and regulate the propagation of all such impressions. I shall presently show, that this objection will not hold good, but before doing so, I must first explain the manner by which those structures become injected. In the first place, this *adjunct* phenomenon, as far as I am aware, is never produced unless in decidedly sanguineous habits; and when it does occur, it is in instances of *intense* blushing, where

the exciting impression has been repeated on the sensorium several times in quick succession; each impression or impulse producing a corresponding suffusion of the cheek with blood, similar to that described in a preceding page. When this is the case, the organic nerves become in a manner overcharged by nervous influence, part of which is radiated from the circle to the different organs highly endowed with involuntary power. Now, when this nervous influence is being transmitted through the sympathetic nerves in such profusion, they propel through their splanchnic branches to the *renal plexus* a considerable portion of the *vis nervosa*, whence it is conducted to the corpora cavernosa by their organic filaments derived from this source.

This circumstance demonstrates not only a remarkable sympathy between this organ and the cheek, but also a close analogy between their structure; it proves that the latter as well as the former possesses the characteristics and properties of an *erectile tissue*, and that both are liable to become injected with blood from the same mental emotion. I firmly believe, that the orgasm of this structure is produced solely by the influence of the organic nerves in this instance—it is not a spinal act—and if the spinal nerves are concerned, it is merely by implication—by the universal systemic exitement that has been effected by the involuntary acts of the mind.

The impulse exciting the turgescence of the corpora cavernosa does not emanate from the *true seat of the passions* in the case I have alluded to; it is not excited by sensual sensation; that appetite, on the contrary, is dormant. The swelling of the corpora cavernosa with blood is, in this instance, purely from an emotion of the mind; it beautifully illustrates the laws of sympathy in the human frame, and that peculiar state of feeling or *consent*, which is evinced between certain structures and the vital fluid.

The mechanism of the *decline* of the blush, and the remarkable *paleness* which follows, is, as I have already said, fully as interesting and as worthy of attention, as the production of the phenomenon itself. When the paroxysm has subsided, the muscles of the face again resume their wonted tonicity, by which the drooping of the countenance gradually disappears. The eyes begin to lose their languishing and downcast aspect. The eyebrows become once more elevated, and the blood progressively recedes from the surface towards the deeper seated vessels, accordingly as the nervous impulse is withdrawn. It is during this retrograde movement of the blood that the cheek is so liable to become again suddenly suffused, like a jet from a fountain, if the mind be in the least degree excited. It is curious that during this and the other mental emotions in which the capillaries and small arteries are particularly engaged, the *veins* are not at all influenced,

and this is explained by the fact of the former being supplied by nervous branches from *the sympathetic*, whereas the latter receive no filaments from this nerve. On this interesting point Dr. Alison makes the following observation :—

" Several organs belonging to the department of *organic* life, which are much influenced by mental emotions and sensations, as the heart, the bowels, the capillary arteries, the secreting organs, &c., are chiefly supplied with nerves from the ganglia and plexuses of the sympathetic nerve. And it is remarkable that the *veins*, in which no influence of these mental acts is discernible, have in general *no such nerves*."

The peculiar *pallor* that immediately succeeds the blush resembles more the " pale cast of thought" than the *whiteness* of fear ; it differs principally from the latter in the aspect of the countenance remaining unchanged, and in its natural state of expression. How wonderful are all these physical changes in the human countenance, by which we are enabled to judge with mathematical certainty of the internal feelings of our fellow beings ! There is an expression of the countenance to denote individually pleasure and pain, hope and fear, rage and shame, and to man, who is but as a drop in the ocean, compared with all the other beings in the wide field of creation, these emotions are chiefly peculiar. In my humble opinion, the sim-

ple doctrines of Lavater* on the expression, &c., of the human countenance, are far more correct, and certainly more philosophic than all the plausible theories of modern phrenologists. The expression of the eye alone is, oftentimes, sufficient to denote the character of the individual much more accurately than the most minute phrenological calculations.

"What can be more significant," observes a late writer, "than the sudden flushing and confusion of a blush—than the sparkling of rage, and the lightenings of a smile? The soul is, as it were, visible upon these occasions—the passions ebb and flow in the cheeks, and are much better distinguished in their progress than the changes of air in a weather-glass. The countenance seems designed not only for ornament but for information. The passions there displayed make way for commerce and communication, and help to let one man into the sentiments and affections of another. Here, joy and grief, resolution and fear, modesty and conceit, inclination, indifferency, and disgust are made legible. The character is *fairest* and best marked in children, and those who are unpractised in the little hypocrisies of conversation; for when nature has learned to put on art and disguise, the forehead is not easily read.

* Notwithstanding his mistaking a highwayman for a philosopher upon one occasion.

The face being designed to be unclothed, and in view, God has there fixed the seat and visibility of the passions, for the better direction of conversation. The sudden alteration of the countenance is very remarkable. A forcible object will rub out the richest colours at a stroke, and paint others of a quite different appearance. A vigorous thought, or a surprise of good fortune, dispels the gloom and lightens the air immediately.*

Before concluding, I have one more observation to make, as to what *class* of the emotions blushing comes under. The different emotions are divided by writers into two classes, viz.—exciting and *depressing*. Now, to which of these does the emotion that excites the blush belong? It is generally placed by physiologists in the first, and although the turgescence of the cheek with blood during the emotion would seem to prove the accuracy of this statement, still there is good reason, in my opinion, to doubt its correctness. The countenance has evidently the appearance of deep depression, notwithstanding the suffusion of the face; we know of no other *exciting* emotion in which the features droop, and from which there is a feeling or sensation of oppression in the præcordia during the time it lasts. How, then, are we to account for this? The following appears to me to be the explanation:—

* J. Elmes.

The phenomenon of blushing is not the result of an *exciting* nor, strictly speaking, of a depressing emotion—but it is a compound of both—in other words, it is the product of a MIXED emotion of the mind. The internal faculty *excites* an indescribable sensation, which causes the face, the external field of action, to *droop* or assume the aspect of depression. Compare the flush of *rage* with that of *shame*, and the appearance of the features in both instances, which, perhaps, may demonstrate more clearly what I have asserted. The colour is nearly the same in both cases; but, observe the striking difference in the countenances—the features of the one are strained to a point, whilst those of the other languish. In the former, the countenance, the "mirror of the soul," reflects the *true* image of the internal excitement; whereas in the latter, the external image, if we were to reason from analogy, is false.

Lachrymation or weeping, when produced by grief, is the result of an emotion more closely resembling that of blushing than any of the others to which man is subject; indeed, as we have already seen, blushing not unfrequently terminates in the involuntary shedding of tears, both being produced by the impulse of *shame*. We may, therefore, infer that *weeping* is, strictly speaking, more the product of a *mixed* emotion than of one truly depressing.

There are many grown-up individuals in whom this is evinced—I have known one family, consisting of father, mother, and ten children, all of whom, without a single exception, were prone to false blushing, to a most painful degree. The children were all grown, and some were sent to travel, in order to wear away this diseased sensibility; but nothing was of the slightest avail—the same state of feeling still continues, and the tear-drop may be seen starting upon the eye of the youngest during the act of *intense* blushing.

CONCLUSION.

TREATMENT, MORAL AND PHYSICAL,

OF THE

MENTAL EMOTIONS ARISING FROM DISEASED SENSIBILITY.

One of the greatest vices of civilization is that state of morbid sensibility treated of in the First Division of this Essay.

It is the source of a variety of evils incidental to civilized existence—it is not unfrequently a remote cause of mania, monomania, melancholy, despondency, and suicide—it is this diseased feeling that infuriates its victim—that drives him to despair from a consciousness of his mental subjugation—that often curbs the mind from responding to the dictates of the will, preventing the former from exhibiting its powers, whatever they may be, and by this means marring the happiness of the individual. It makes him hate society—in short, all kinds of social intercourse—for there he glaringly sees, and is keenly alive to his own *natural* defects;

he feels himself alone, and fancies he is neglected, an outcast; his sensitive soul is highly susceptible of all the whims that are constantly being engendered by his wanton imagination. If his temperament be phlegmatic, brooding melancholy finally rules over his mind; it may be seen externally stamped upon his brow—if sanguineous, the fervid imagination predominates; the moral powers are sunk, and in the frenzy of despair he not unfrequently plunges into the depths of recklessness and libertinism.

This morbid condition of the feelings is also the source of the false blush, and the mental embarrassment attendant upon it in society. Although the latter has not hitherto been regarded as a disease, it is my humble opinion that in its *intense* form it should certainly come under the head of "Nervous Disorders," and be looked upon as a *true* disease, arising from weakness or debility, most frequently in the mental faculties, but likewise often occurring from bodily or corporeal indisposition. If, therefore, we regard this form of the blush, together with other intense emotions, as the result of mental disorder, we are naturally led to offer some observations as to the manner of obviating or controlling their baneful influence upon the disposition of the individual in early life, as also the uneasiness and confusion they produce in maturer years, when he is called upon to fulfil his part in society, and perform the common duties of life.

There are two methods of education, the one for early, the other for maturer years, by the adoption of which many of the evils attendant upon diseased sensibility may be in a great measure obviated; these are, moral and physical training. The first inculcates an early exercise of the reasoning powers, by which means, if duly applied, the parent may be convinced of the possibility of counteracting, to a considerable degree, the painful predisposition of the most morbidly sensitive mind, to indiscriminate impressions. The other, or that for more advanced years, embraces a variety of physical exercises, by means of which the body (usually irritable and feeble in these instances) is rendered more vigorous, its tone improved, the functions better performed, and, as a natural consequence, the mind rendered less irritable from the general improvement of the system.

MORAL TRAINING.

It has been stated in a former page, (and I am sure few will doubt the accuracy of the observation,) that, from the earliest infancy of a child, you can detect the bent of its disposition. If it be quick and sensitive, you may easily observe the susceptibility of the mind, and the keenness with which certain impressions are felt; and as this child grows on towards manhood, you will perceive this state of feeling, if unchecked in its early state,

ripening itself through every phasis of his existence, until it becomes a *true* disease. As soon as a child so predisposed is capable of the slightest reflection, the judicious parent should at once begin to adopt those measures suitable to the age of the child, and likely to prove beneficial in restraining the sensibility of the mind; it, however, not unfrequently happens, that from bad management and mistaken views on the part of the parent or guardian, the incipient malady, instead of being removed by this *early* training, becomes more firmly rooted, so much so, as in after-life to oppose every remedy whatever, to exhibit itself more strikingly than before, and in this uncontrolled form it proves highly prejudicial to the interests of the individual.

The first consideration to be observed, in all cases in which morbid sensibility of the mind evinces itself in early life, should be regarding the disposition or temperament of the individual, whether it be of a sanguineous, phlegmatic, choleric, or melancholic turn; but as a general rule, the method to be adopted, in all instances, should be of an essentially soothing character, being merely graduated to each, according to the urgency of the case, and as circumstances may require; for instance, the child of a silent and listless habit will require, blended with that mild treatment mentioned, kindly encouragement—a moral stimulus—and great care to prevent his mind hereafter from verging upon melancholy or madness; whereas, on

the other hand, one of a sanguineous constitution will require the fervid imagination and keen susceptibility usually attendant on such habits, to be gently and gradually subdued, and brought under the control of the will and the reasoning powers, by timely well-directed moral restraint. Mild treatment, in all cases of mental irritability, will invariably be found to have a decidedly more beneficial effect than harsh or severe means; by the former, you can ultimately make a child of the most obstinate and excitable disposition subdued and tranquil; by the latter, you only render the sensibility more evident, and the child himself taciturn, surly, and morose—his obedience to your instructions is merely compulsory, and not from conviction that they are intended for his good, the inculcation of which should be the grand aim of all entrusted with the care of youth.

It is vain to suppose that by constantly reproaching and upbraiding children or young people for shyness or timidity, you will remedy these evils. The fault is not theirs; on the contrary, it is a natural defect, though frequently increased by bad management; and the very dread of parental reprovement which usually haunts the minds of persons so brought up, instead of obviating the baneful effects of sensibility, for which it was intended by the anxious parent, will be sure to excite that state of feeling on every opportunity, and when the individual himself may be using every endeavour to sup-

press it. "Nothing is more painful to young people than to have their feelings and countenances scrutinized, and the degrees of their sensibility measured by the surveying eye of the unmerciful spectator. Under the constraint of such examinations they can think of nothing but that they are looked at, and feel nothing but shame or apprehension;" they are afraid to lay their minds open, lest they should be convicted of some deficiency for which they might afterwards be reproved.

The season of universal smiles and courtesy of childhood (observes an admirable writer on this subject) is delightful while it lasts, but it soon passes away; they soon speak without exciting any astonishment, and instead of meeting with admiration for every attempt to express an idea, they are repulsed for troublesome volubility; even when they talk sense they are often checked for unbecoming presumption. Children feel this change in public opinion and manner most severely; they are not sensible of any change in themselves, except, perhaps, they are conscious of having improved both in sense and language. This unmerited loss of their late gratuitous allowances of sympathy usually operates unfavourably upon the temper of the sufferers; they become *shy*, and *silent*, and reserved, if not sullen; they withdraw from our capricious society, and endeavour to console themselves with other pleasures. * * * Children of a timid temper or of an indolent disposition are quite dispirited and

bereft of all energy in these circumstances; others with greater vivacity and more voluntary exertion, endeavour to supply the loss of universal sympathy by the invention of independent occupations; but they feel anger and indignation, when they are not rewarded with any smiles or any praise for their "virtuous toil." They naturally seek for new companions either amongst children of their own age, or amongst complaisant servants.*

These judicious observations apply equally to young people as well as to children. If the former, when first brought into society, feel embarrassed or become suffused for trivial causes, (by no means an unfrequent occurrence,) and are afterwards rebuked by their parents for their shyness and awkwardness, they will constantly be in dread of committing the same *offence* again when similarly situated, and rather than run the risk of being taunted or laughed at, will naturally endeavour to avoid or shun *that* society, which instead of being a pleasure, is a continued source of painful restraint and exposure of their internal sensibility. I have known a family in which this was strikingly exemplified; indeed, two of the daughters frequently *wept*, when obliged to mingle in society, so intense was this diseased state of mental excitability; others, again, while hearing a sermon, may be seen to flush and turn pale alternately, merely from extreme suscepti-

* R. L. Edgeworth on "Sympathy and Sensibility."

bility. In the Life of Sir Walter Scott, we find an example of a man of learning and genius, an advocate, and afterwards judge of the Supreme Courts of Scotland, who was a melancholy victim of this morbid sensibility. His highly sensitive mind was easily and deeply affected by the slightest impressions, and he had frequently been observed to weep like a child at hearing a pathetic tale recited. This diseased predisposition, which he could never overcome, was a burden—a drawback upon his intellectual faculties, ever restraining his mind from fully displaying its natural powers, which in this instance were possessed to a high degree; and at length he died in the prime of life, a martyr to the stings of wounded feeling.

I would seriously urge parents whose children are the subjects of this extreme sensibility to endeavour to check, by every means in their power, the growing evil; as neglect in early life of those morbid symptoms often leads the unhappy victim to seek a refuge in low company, and not unfrequently ends in his withdrawing from society altogether. When this "mauvaise honte" appears, instead of ridicule and reproaches, I would recommend the utmost kindness to be shown, united with the exertion of every influence that may tend to inspire confidence.

Some appear to feel sensations of pleasure or pain with more energy than others—they have more feeling than reflection; great care should be taken

to encourage persons of this temper to describe and compare their sensations; and when young people are observed to be overwhelmed with confusion or timidity, on coming into contact with their fellow-creatures, the parent or preceptor should gradually and with great delicacy endeavour, if possible, to draw from them a description of their feelings. If the timidity is found to proceed from distrust of their own powers, ignorance, or false associations, means should be taken to establish self-approbation, "as a considerable portion of the happiness of life arises from a well grounded sense of this feeling"—we should, therefore, secure its gratification, and at the same time, by reasoning, dispel all mistaken or confused ideas. As repetition makes all things easy, and the faculties of the mind may be strengthened by exercise, as well as the members of the body, I would suggest, as a remedial measure, bringing the young person into the same situation and circumstances as first excited the mental paroxysm, again and again, if possible, until use had rendered the exertion easy; for, as Bichât remarks, *habit blunts the sentiment*, and the more we regard an object, the less are we sensible of its agreeable or painful qualities.

As another resource for strengthening the mind, "I would accustom youth to habits of observation on passing events, which would often be more advantageous than the multiplicity of tasks and lessons, with which the tender mind is so frequently loaded; let

the judgment be exercised upon the objects of their senses, as a mind early accustomed to act upon what it sees, will acquire a degree of vigour and discrimination, extremely serviceable in all the difficulties and intricate circumstances to which human life is exposed." I would exercise and improve the mental and moral capacities as much as possible, and enlighten the understanding in order to give the pupil the power of forming his rules of conduct on a solid basis, so as to give him sufficient strength of mind to abide by the principles he has formed. "Frankness towards youth produces frankness in return, one of the most pleasing qualities of the human heart; but this attribute family coolness and family reserve have a continual tendency to suppress, so that they who are brought up under this system, generally acquire an unamiable cast of character through life. Let a frank simplicity and cordial sympathy with their children ensure to parents their disinterested friendship—for where this is withheld, all confidence is sure to become chilled and repressed." If parents and individuals entrusted with the care of youth will make trial of the simple rules here laid down, commencing as early as the first symptoms make their appearance, and graduating them according to the development of the understanding and capacities of their young charges, I am sure their labour and exertions will be, in the majority of cases, attended with that reward which is the main object of their wishes.

PHYSICAL TREATMENT.

To the gymnasium of Elis and the games of Olympia are to be attributed the first public encouragement of physical or corporeal exercise. Here were exhibited and encouraged those feats of agility and strength, such as running, wrestling, leaping, and throwing of the quoit, so conducive to the health and vigour of both mind and body; and to these were also added, intellectual contentions in poetry, eloquence, and the fine arts.

Long after the Olympic games had ceased to exist, the gladiator fights were introduced at Rome by the Bruti, and from a barbarous commencement, these sports were, in succeeding ages, so modified, as to induce many of the Roman senators, knights, and citizens, to enlist themselves among the gladiators, in order to procure esteem and popularity. Nero is said to have exhibited upon one occasion four hundred senators and six hundred knights. In the East these exercises were also publicly encouraged; and Cyrus made it, in a manner, a law to the Persians, whose good education was a great part of his care, that they should never eat but after labour. Civilization, in correcting the evils and barbarous customs of past ages, has not unfrequently erred in the opposite extreme—*i. e.*, in over refinement; and in no other instance is this more glaring than in the various and ludicrous distortions

to which the human frame is now subjected by the ever varying fashions, and the almost total neglect of bodily exercise amongst the higher ranks of society. To this source may be traced a variety of the diseases to which these classes are so liable; hence we may account for the majority of cases of spinal deformities, contortions of the limbs, and general malformation. To the same origin may also be referred several of the most distressing of the nervous disorders, such as hysteria, epilepsy, mental irritability, despondency, melancholy, &c.; and lastly, almost every case of difficult or fatal parturition is, in a great measure, owing to either of these vices. It was from a knowledge of the injurious effects of sedentary habits on the body, that Hippocrates* observed, "Rest makes the body moist and weak—exercise makes it dry and strong." This ancient writer observes again, when treating of chlorotic girls, "Food and exercise have opposite effects, yet mutually contribute to health—exercise consumes what is in the body, and meat and drink fill up the deficiency." Galen even recommended old people not to abstain from exercises; he orders them to keep up their accustomed labours, only to lessen the violence of them; and Celsus remarks, that idleness renders both mind and body dull, but labour strengthens them—"the first brings on old age betimes, but the latter occasions

* De Victus Ratione Sanorum.

a *long youthfulness*." Continued rest has been noticed by Sanctorius as a most frequent cause of indigestion; thus he observes, in Aphorism 389, "long rest renders sickly bodies heavier, because the meat and drink are not digested, and the excrementitious perspirable matter is not prepared to be discharged; whence all manner of diseases, and even death itself, follow as consequences;" even in healthy people when the perspiration is deficient, he recommends exercise as the best restorative; and Van Swieten, in his admirable Commentaries on Boerhaave's Aphorisms, makes the following judicious observations—"Rest of body, or a neglect of proper exercise, not only impedes the ultimate attenuation of the aliments, but also retards the expulsion of such parts as *ought naturally* to be discharged from the body, in order to maintain health." Sydenham had so high an opinion of exercise on horse-back, that he believed by this alone he could cure a consumption, provided it was not too far gone.

Notwithstanding the recommendations of bodily exercise by these and many other illustrious writers of both ancient and modern times, the art of gymnastics has until very lately been allowed to remain in unmerited neglect. It is only now that medical practitioners are beginning to see their great utility as a remedial measure in a variety of complaints incidental to civilized existence, and therefore they are becoming more frequently pre-

scribed in both medical and surgical cases. It is lamentable to look back upon the old regime of boarding-school *physical* education, and the pernicious effects it has produced in society. The multiplicity of distortions and deformities of the limbs and body (and let the reader recollect that the corporeal frame is never in any degree injured without materially affecting the mind) that were produced by those destructive engines, viz., collars, backboards, stocks, &c., the usual paraphernalia of such establishments, is as incredible as it is to be deplored. The most frequent diseases of boarding schools are consumption, chlorosis, dyspepsia, and curvature of the spine; and the *source* of these maladies may, with few exceptions, be traced to the above causes. How many a parent has had her fondest hopes blighted by these pernicious instruments! How often have we not seen young girls in the bloom of youth and health when sent to school, returning in a few years with their constitutions undermined, with curved spine, with sunken eye, with blanched cheeks, with bloodless lips, and in a little time the red flag of death (the hectic flush) is planted upon the pallid cheek, in order, as it were, to deceive the observer, and steal the life of its victim imperceptibly away! Now, what is this sudden and fatal change owing to? The following is, in my opinion, the true explanation:—At the generality of boarding-schools it has been the invariable practice of the mistresses, when-

ever a girl appeared at all awkward or inclined to stoop, to have immediate recourse to the "collar" and "backboard," in order "to give the young lady a proper carriage," and, in addition to these tortures, should her feet not be sufficiently turned out, the unhappy girl was placed in "stocks," by which means both heels were placed together, and the toes pointed in straight lines from either side of the body, and in this position she was compelled to sit for hours together. These three instruments, constituting in themselves an *infernal machine*, were so constructed, that when applied to young *growing* girls, they produced the most baneful consequences; in the first place, they prevented the body and limbs from moving either one way or the other, consequently the whole frame must have been maintained in the same fixed position during the period of their application. This sedentary habit in itself was quite sufficient to produce indigestion. The immovable position of the neck and back for so long a time, only rendered the muscles and ligaments of these parts feeble and weak, (a natural result of the want of exercise,) and the consequence was, that the spinal column, from the want of support, yielded to one side, not unfrequently to both, forming a double curvature like the letter S; this state of things went on for some time without attracting any attention, until at length one of the hips became visibly prominent, which then attracted notice to the part; but when this happened it was generally

too late, the disease was too far gone to be remedied —the chest became narrowed—the lungs could not expand—and if the individual escaped sinking under the shock which her still tender frame had received, it was only to drag on a wretched existence of deformity and sickness. The apparatus for the feet was equally injurious, independent of the painful position in which the limbs were kept; the ligaments and muscles of the hip, knee, and ankle joints were more or less injured by the straining which this unnatural torture of the feet produced. It was like turning a stream against its course to endeavour to force these muscles to act in a manner which nature never intended them to do; and it only frustrated the very ends which it was intended to fulfil; for the ligaments became stretched —the joints loosened—and when the limbs were again let free, the feet turned inwards more than ever, whither, in a certain degree, they are naturally inclined.

The manner in which young girls were made write was another evil of the first magnitude, in boarding-school education. My respected preceptor, Dr. Macartney, of Dublin, used frequently to allude to this, and the following observation is taken from manuscript notes of his lectures:— "Girls in boarding schools are in a sad way for want of exercise; and the abominable manner in which they are made write with the entire body *twisted out of its natural position*, brings on curva-

ture of the spine; when the menstrual period comes on there is no discharge—consumption follows, and terminates in the death of the person."

The physical treatment I would recommend to both growing and grown-up individuals subject to diseased sensibility, is a regular course of gymnastic exercises, graduated according to the age, sex, constitution, &c., of the person. It is almost incredible what wonderful effects may be produced on the *mind* by physical training; and if this system was more generally cultivated in boarding schools and private families, than those barbarous instruments before alluded to, society would have been spared a series of evils which were inflicted on it by the old plan. Some parents, perhaps, may imagine that the *female* form is too delicate and feeble for the practice of gymnastics—but let it be remembered what the intention is with which they are entered upon. "It is not solely for the purpose of exercising such power as the individual may be already possessed of—but by a well-devised gradation of movements, to procure an additional supply of strength." Let any, even the weakest, make the trial, and at the expiration of a month—nay, even of a week, there will be an evident increase of strength and constitutional vigour. In these exercises, we should begin with the most gentle, and increase them by degrees. "Those exercises of the body are more especially serviceable, which give delight to the mind at the same

time; and in male cases, tennis, fencing, &c., are particularly adapted for this purpose—for which reason the wisdom of antiquity appointed rewards for those who excelled in these gymnastic exercises, that by this means the bodies of their youth might be hardened for warlike toils.* In France the gymnastic system of education is very much cultivated; there are several institutions, both public and private, for this purpose in Paris, all conducted in a most scientific manner; but one in particular claims our especial regard in this place. The gymnasium alluded to, viz.—the "*Institut Orthopedique de Paris,*" is conducted on an extensive scale by MM. Pravaz and Jules Guerin, two able and scientific *physicians*. This establishment is devoted to the treatment of Deformities of the Spine and Limbs, occurring in individuals of either sex; and the plan principally relied upon, is a series of gymnastic exercises, adapted to the age and constitution of the patient, and well regulated diet. The system pursued in this institution is based upon the principles of physiology and animal mechanics, and when conducted by such scientific men, cannot fail to be attended with success. MM. Pravaz and Jules Guerin do not pretend to be able to cure all cases of deformity; it is only where the curvature is recent, and in individuals whose growth is not complete, that they expect to find the bene-

* Mercuriali de Arte Gymnastica.

ficial effects of their mode of treatment fully developed. They strongly protest against the practice of using *corsets* and *girdles*, and, in short, the whole paraphernalia of the old regime. It is astonishing what a salutary effect this physical training has on the mental irritability usually attendant on bodily deformity, for, as Dr. Macartney, who strongly advocated the system of gymnastics, used to observe] in his admirable lectures, "It not only carries on the natural secretions and excretions, but it likewise *strengthens the mental faculties*, as well as it invigorates the bodily functions."

Mercuriali recommends *weak* people to begin with the gentlest exercises, as by swinging on a rope with a slow oscillatory motion, for it is particularly to be borne in mind that the strength is never to be *over*-exerted, so as to produce a sense of lassitude, or weariness, as this would be injurious even to the most vigorous constitutions. To weakly girls, languishing under chlorosis, Van Swieten recommends, as a sovereign remedy, *steel* and *bodily exercise*. By these remedies, he says, "the tumid face shall begin to subside, the lips and cheeks become tinctured with the rose, and the wonted vigour return to the whole body." In very weak people the ancients used to exercise the muscles by *friction*, on which they set a very high value, both as a preservative of health, and serviceable in the cure of many diseases; thus Hippocrates has said, that "friction may loose or bind, may make plump or

lean: if hard, it binds; if soft, it loosens; if violent, it diminishes; if moderate, it fills up. And Columella* observed, "The bodies of cattle ought to be rubbed down daily, as well as the *bodies of men*, for in both instances it tends to produce health, vigour, and long activity."

Before concluding this subject, I beg to say, that from experience and observation, I can strongly recommend the gymnastic system of education to the attentive consideration of parents, guardians, and all who are entrusted with the care of youth; for "the development of the physical powers is not the exclusive object which we attain by gymnastic exercises; the intellectual and moral capacities are as obviously influenced—the mind becomes better adapted to its pursuits—habits of irritability, moroseness, languor, indolence, and effeminacy are removed—and in their stead, a cheerful buoyancy of spirit, liveliness of disposition, and a mind glowing with intrepidity, at the same time within the control of the individual, are invariably substituted."

* De re Rusticâ.

THE END.

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