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ILLUSTRATIONS

OF THE

INFLUENCE OF THE MIND UPON THE BODY

IN HEALTH AND DISEASE.

"Some are molested by Phantasie; so some, again, by Fancy alone and a good conceit, are as easily recovered. . . . All the world knows there is no vertue in charms, &c., but a strong conceit and opinion alone, as Pomponatius holds, *which forceth a motion of the humours, spirits, and blood, which takes away the cause of the malady from the parts affected.* The like we may say of the magical effects, superstitious cures, and such as are done by mountebanks and wizards. As by wicked incredulity many men are hurt (so saith Wierus), *we find, in our experience, by the same means, many are relieved.* . . .

"Imagination is the *medium deferens* of Passions, by whose means they work and produce many times prodigious effects; and as the Phantasie is more or less intended or remitted, and their humours disposed, so do perturbations move more or less, and make deeper impression."—*Anatomy of Melancholy.* BURTON, 1651.

ILLUSTRATIONS

OF THE INFLUENCE OF

THE MIND UPON THE BODY

IN HEALTH AND DISEASE

DESIGNED

TO ELUCIDATE THE ACTION OF

THE IMAGINATION.

BY

DANIEL HACK TUKE, M.D., M.R.C.P.,

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"There is not a natural action in the Body, whether involuntary or voluntary, that may not be influenced by the peculiar state of the mind at the time."

JOHN HUNTER.

LONDON:
J. & A. CHURCHILL, NEW BURLINGTON STREET.
1872.

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TO

SIR JAMES PAGET, BART., F.R.S., D.C.L. OXON.,

SERJEANT SURGEON-EXTRAORDINARY TO THE QUEEN,

LATE LECTURER ON GENERAL ANATOMY AND PHYSIOLOGY

AT

St. Bartholomew's Hospital,

AND

Warden of the College,

IN GRATEFUL ACKNOWLEDGMENT

OF

THE INFLUENCE OF

HIS HIGH MORAL AND INTELLECTUAL QUALITIES

THIS WORK IS INSCRIBED

BY

AN OLD PUPIL.

PREFACE.

In November, 1869, I met with the following in a newspaper under the heading of "The Curative Effects of a Railway Collision:"—

"Allow me to confirm all that your two correspondents have related with respect to the alarming collision on the 17th inst. on the Midland line.

"Nothing needs to be added either to their descriptions of the circumstance or to their just condemnation of the reckless negligence which brought us so near to death; but the shock produced so curious an effect on myself—an effect, perhaps, unparalleled in the history of railway accidents—that you will, perhaps, excuse my troubling you with the details.

"At my hotel in Manchester on Tuesday night I was seized with all the symptoms of a violent attack of rheumatic fever; in fact, my condition so alarmed me, and my dread of a sojourn in a Manchester hotel bed for two or three months was so great, that I resolved to make a bold *sortie*, and, well wrapped up, start for London by the 3.30 p.m. Midland fast train from the London Road terminus. From the time of leaving that station to the time of the collision, my heart was going at express speed; my weak body was in a profuse perspiration; flashes of pain announced that the muscular fibres were under the tyrannical control of rheumatism, and I was almost beside myself with toothache. Crash! smash! bump! and bang! and from side to side of the carriage I went like a billiard ball

under a hard cushion hit. The compartment was soon seen to be sprinkled with the blood of a hapless victim whose face had come into crushing contact with it."

The rest of this part of the paper was unfortunately wanting, but I learnt from other sources that, as the heading intimated, the patient was cured of his rheumatism. The remarks which this circumstance elicited from the press (general and medical) led me to think that the whole subject of the influence of the Mind upon the Body, deserves more serious and systematic consideration than it has received. In forwarding soon after to the 'Journal of Mental Science'* a paper bearing the title of the present work, I observed, "It is now some time since I endeavoured to formularise the generally admitted facts of physiology and psychology so far as they bear on this question, and to collect from the sources at my command all authenticated facts illustrative of this influence. Dissatisfied with my work I laid my cases aside. Judging, however, from the remarks made, that imperfect as these cases are they may be of some service, I conclude to forward them to the Journal of the Association."

The objects of the following pages may be thus stated:

1. To collect together in one volume authentic Illustrations of the influence of the Mind upon the Body, scattered through various medical and other works, however familiar to many these cases may be, supplemented by those falling within my own knowledge.

2. To give these cases fresh interest and value by arranging them on a definite physiological basis.

3. To show the power and extent of this influence not only in health in causing Disorders of Sensation, Motion, and the

* About 190 pages have appeared in that Journal. The chapters already published have been much extended, and Part IV, treating of the Influence of the Mind upon Disease, is in common with several chapters, entirely new.

Organic Functions, but also its importance as a *practical* remedy in disease.

4. To ascertain as far as possible the channels through, and the mode by which this influence is exerted.

5. To elucidate, by this inquiry, the nature and action of what is usually understood as the Imagination.

> "Quicquid agunt homines, votum, timor, ira, voluptas,
> Gaudia, discursus, nostri est farrago libelli."

There are two classes of readers to whom I wish more especially to address myself. The medical reader who, I hope, may be induced to employ Psycho-therapeutics in a more methodical way than heretofore, and thus copy nature in those interesting instances, occasionally occurring, of sudden recovery from the spontaneous action of some powerful moral cause, by employing the same force designedly, instead of leaving it to mere chance. The force is there, acting irregularly and capriciously. The question is whether it cannot be applied and guided with skill and wisdom by the physician. Again and again we exclaim, when some new nostrum, powerless in itself, effects a cure, "It's only the Imagination!" We attribute to this remarkable mental influence a power which ordinary medicines have failed to exert, and yet are content, with a shrug of the shoulders, to dismiss the circumstance from our minds without further thought. I want medical men who are in active practice to utilise this force, to yoke it to the car of the Son of Apollo, and rescuing it from the eccentric orbits of quackery, force it to tread, with measured step, the orderly paths of legitimate medicine. "Remember," said Dr. Rush in addressing medical students, "how many of our most useful remedies have been discovered by quacks. Do not be afraid, therefore, of conversing with them, and of profiting by their ignorance and temerity. Medicine has its Pharisees as well as religion; but

the spirit of this sect is as unfriendly to the advancement of Medicine as it is to Christian charity."*

The other class comprises those non-medical readers who may happen to peruse this work; and these, the author hopes, may be disposed to regard in a different light from what they may heretofore have done, the success of some of the fashionable modes of treatment current at the present day. Some of those, also, who are interested in the manifestations of Modern Spiritualism, may find it worth their while to acquaint themselves fully, *in the first instance*, with those phenomena which may certainly be explained by a reference to the principles laid down in these pages. From this point of view this book may, perhaps, be regarded as somewhat of an introduction to the study of the alleged facts, which now attract so much attention, for whatever may be the explanation ultimately arrived at in regard to them, it is equally essential to ascertain what is the range of the phenomena which can be fairly explained by well-recognised psycho-physical principles.

Cerebral Physiology and Mental Philosophy have been referred to, so far as is essential to elucidate by the application of admitted principles, the cases which are recorded in this work. The collection of so many striking illustrations of the profound influence of the Mind upon the Body would alone serve to convince the reader of the absurdity of dismissing such cases with the flippant remark just referred to, as if the Imagination could solve a great many difficult and inconvenient problems, but could never be employed for any useful practical purpose. But however valuable a simple collection of cases may be, and certainly "Truth can never be confirmed enough," the author thought its value would be greatly enhanced by arranging them

* He thus continues, after reminding his class that improvement in Medicine is not to be derived only from colleges and universities, "In the pursuit of medical knowledge, let me advise you to converse with nurses and old women. They will often suggest facts in the history and cure of diseases which have escaped the most sagacious observers of nature." He adds that by so doing "you may discover *laws of the animal economy which have no place in our systems of nosology or in our theories of physics.*"

in accordance with the generally received psychological and physiological principles.

If the labour and thought required to prepare a reliable collection of psycho-physical phenomena, such as the present work contains, be any measure of its utility to the reader in quest of facts of this nature, I venture to hope that such an inquirer will not be unthankful for the assistance now rendered him; and to those who are familiar—possibly *ad nauseam*—with many of the cases which are given, I am inclined to think, judging from my own experience, that they will find it convenient to have in one volume, for ready reference, a number of cases not readily found in the Journals and many publications of an ephemeral character. My aim therefore has mainly been to ascertain and apply the already known. As Browning says—

> "To shoot a beam into the dark assists;
> To make that beam do fuller service, spread
> And utilise such bounty to the height,
> *That* assists also, *and that work is mine;*"

holding, as I do, with Lord Bacon, that "Every man is a debtor to his profession, and ought of duty to endeavour to be a help thereunto."

August, 1872.

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ERRATA.

Page 16, line 16, *for* lvii, *read* lv, II.
„ 63, „ 24, *omit* "long."
„ 65, „ 9, *for* in which expectation, *read* in which there is expectation.
„ 136, „ 30, *for* attended, *read* offended.
„ 335, „ 23, *for* Grey, *read* Guy.

N.B.—*The figures in parentheses refer to the Titles of the works given at the end of the volume. The ordinals have reference to the volume.*

ILLUSTRATIONS

OF THE

INFLUENCE OF THE MIND UPON THE BODY.

INTRODUCTORY CHAPTER.

The Mind acts upon the Body through its threefold states of—

I. Intellect.
II. Emotion.
III. Volition.

The terms chosen for the title of this work accord with popular usage, and are probably less likely to mislead than any others which might be used; but the only satisfactory mode of stating the case would be one founded upon a correct and complete physiology of the brain, or rather of the entire Nervous System. Great, however, as has been the advance of late years in the knowledge of the functions of this system, it does not enable us to speak with perfect physiological precision on all points; and it is more than probable that no amount of scientific knowledge will ever displace the time-honoured phrases of "Mind" and "Body." Psychologically, we intend to convey by the title we have adopted, the design of illustrating by a considerable collection of striking Cases the often admitted, but too frequently forgotten, and still more frequently neglected, truth, that the state of the Mind, comprising therein Intellect, Emotion, and Volition, exerts an enormous influence, for good

or evil, upon the body with which it is associated—including in this term all Sensations, Movements, and the Organic Functions. It must be clearly understood that under "Mind" we do not, and that under "Body" we do, include the special senses. "Feeling," as usually employed, comprises these and Emotion, but it is the latter only which we here regard as the cause, or, at least, the antecedent of bodily change. Sensation (general and special) is treated of, as being influenced by intellectual, emotional, and volitional states.

Physiologically considered, the Illustrations range over the effects produced by the action of the vesicular neurine of the encephalic centres concerned in intellectual, emotional, and volitional states of mind, upon the sensory and motor ganglia, the centre of the sympathetic, and through the outgoing nerves upon the whole body. Whether pure Emotion is a function of the hemispheres, and if not, to which of the lower ganglia it should be consigned, are questions upon which differences of opinion still exist, and will claim some attention in a future section. Be this as it may, however, the cerebral hemispheres act upon the ganglia below them, so far as the Intellect and Will are concerned; and, further, whatever cerebral physiology may teach as to minute points, the Cases brought together in this volume will none the less illustrate the truth, and the importance of the truth, that the Mind or brain influences—excites, perverts, or depresses—the sensory, motor, vaso-motor, and trophic nerves, and through them causes changes in Sensation, Muscular Contraction, Nutrition, and Secretion.

The bearing of the doctrines of the reflex or automatic action of the brain, and of the influence transmitted through vaso-motor nerves, will be considered as we proceed. Their importance must be evident to all who have studied the action of Mind upon Body.

PART I.

THE INTELLECT.

CHAPTER I.

GENERAL PSYCHOLOGICAL AND PHYSIOLOGICAL PRINCIPLES.

SECTION I.—Retrospective Sketch.

Unzer and John Hunter clearly perceived and expressed the mental or psycho-physical law which lies at the foundation of the principal phenomena properly comprised under the influence of the Intellect or Thought upon the body, including sensation as well as motion, especially in regard to the effects of Expectation, and what is ordinarily understood as the Imagination. Thus Unzer in his great work, published in the year 1771, writes:—"We connect with our external sensations the conception of another like to it, which we have had before, and thus a direct Imagination is attached to our external sensation, that commingles its action in the mechanical machines with those of the external sensation." He then explains that sighing at the sight of a person who reminds us of one with whom sorrowful sensations are associated, is the sentient action of the Imagination. He proceeds—"We often connect with our external sensations the *expectations* of others formerly connected with them, and thus a *foreseeing* accompanies our external sensation, which mingles its actions in the mechanical machines with those arising from the external sensation." He illustrates this by the case of a person who always faints during venesection. "Sometimes afterwards he meets the surgeon in the street and becomes faint," and adds that this was "the sentient action of a fore-

seeing of the bloodletting, and only incidental to the external sensation" (i, p. 113). If the phraseology is a little different from what we now employ, it does not conceal the just principle which he recognised. Again, he points out under this division (expectation and foreseeing) that "expectation of the action of a remedy often causes us to experience its operation beforehand."

There is another striking observation made by this physiologist, bearing upon the influence of intellectual states upon the body. He is speaking of the remembrance of a conception, and supposes the case of a person who sees a visionary figure resembling an individual who caused him bitter vexation long before. He becomes pale with fear. This occurs, Unzer points out, before he remembers whom the figure resembles. There is no action of the Will, and no consciousness in the sense of recognition. "How often in such cases," he remarks, "we hear persons say, 'This appearance terrifies, affects, and calms me, without my knowing why; some subordinate ideas, which I cannot remember, must be the cause.' When the person whose figure we have seen, actually appears also, no other action results than as stated above; we become pale as before, but now we know why" (p. 120).

Hunter had his attention drawn to the phenomena of Animal Magnetism, and in his lectures on Surgery (1786-7), delivered a few years later than the appearance of Unzer's work in Germany, explained those which he witnessed on the principle of Attention and Expectation. There is no reason to suppose he was acquainted with Unzer's writings. He says, "I was asked to go to be magnetized, but at first refused, because the spasm on my vital parts was very likely to be brought on by a state of mind anxious about any event . . . and I feared lest it should be imputed to animal magnetism. But considering that, if any person was affected by it, *it must be by the Imagination being worked up by the attention to the part expected to be affected,* and thinking I could counteract this, I went; and accordingly when I went, I was convinced by the apparatus that everything was calculated to affect the Imagination. When the magnetizer began his operations, and informed me that I should feel it first at the roots of my nails of that hand nearest the apparatus, *I fixed my attention on my great toe,* where I was wishing to have

a fit of the gout; *and I am confident that I can fix my attention to any part until I have a sensation in that part.* Whenever I found myself attending to his tricks, I fell to work with my great toe, working it about, &c., by which means I prevented it having any effect upon me" (ii, vol. i, p. 337). It is nearly a century ago since these sentences were written, and those which we have italicised show that the fundamental principle to which we shall have so frequently to refer, in this work, was most clearly comprehended by this remarkable man, who might have been as great a metaphysician as he was a physiologist. It really contains the gist of all that has been written since on the influence of Expectant Attention and the Imagination.*

Müller (1838) gave a luminous exposition of the influence of mental states, especially ideas, upon the bodily movements. "The idea of a particular motion," he says, "determines a current of nervous action towards the necessary muscles, and gives rise to the motion independently of the will." Again, "any sudden change in the ideas, though without Emotion, and having reference to mere external objects, may excite involuntary motions—as laughter" (iii, pp. 944, 1396). Under the heading "movements excited by ideas," he observes that certain groups of muscles are constantly prone to involuntary motion, owing to the excitability of the parts of the brain from which the nerves arise. "The Sensorium acts here in the same way as an individual nerve in which any sudden change of condition, of whatever kind, sets the nervous principle in action." He points out that, in yawning, the *disposition* to the movements of the muscles exists previously, and this "becomes manifested *when the idea gives to the nervous principle the determinate direction.*"

Müller expresses himself as decidedly as John Hunter in regard to the influence of Expectation. "It may be stated, as a general fact, that any state of the body, which is conceived to be approaching,

* It does not follow from this explanation that Imagination, Expectation, and kindred states of mind explain *all* the phenomena produced by mesmerists, nor indeed does it *necessarily* follow that the same phenomena are always due to the same cause. For our present purpose, however, we are justified in saying that certain purely psychical agencies produce certain physical results. With the alleged magnetism of A by B, we are not now concerned, most important and interesting as this would be, if proved.

and which is expected with certain confidence and certainty of its occurrence, will be very prone to ensue, as the mere result of that idea" (p. 1390). He only makes one condition, "if it do not lie beyond the bounds of possibility."

In connection with ideas, whether present to the consciousness or not, the action of the encephalic centres, apart from the Will, and the influence of this action upon sensation and the movements of the body, are of the first importance. The automatic or reflex action of the brain, which has attracted so much notice of late, cannot be disregarded in the consideration of the operation of the mental faculties upon the system.

Unzer, who, to a considerable extent, anticipated the observations of Marshall Hall in regard to the reflex action of the spinal cord, applied the same principle to explain many psycho-physical phenomena. In the following remarkable passage he enunciates the doctrine of the reflex action of the brain in regard to instinctive acts:—"Any painful external sensation immediately excites the war-instinct, and the movements proper to the instinct as instantaneously follow, even in man himself, and before the cause of the sensation is known. Between the external sensation exciting the instinct and its sentient actions, no traces of conceptions can be discovered, consequently there are no material ideas of imaginations, foreseeings, &c., produced by the external sensation; so that there appears to be a direct transition [Uebergang] of the latter into the instinct itself, and the material ideas proper to it to take effect in the sentient actions of the other. *So that it may, in some degree, be asserted that in the instincts, the brain turns back* [umwendete] *the felt impression, and reflects it on the nerves appropriate to the sentient actions of the instinct, just as an unfelt external impression is reflected in the ganglia,* and this without the material ideas of the conceptions necessary to the instinct becoming an object of special thought, they being too little developed; and without its sentient actions being obviously excited and connected with each other, according to psychological laws" (i, p. 289).

Gall is shown by Professor Laycock (iv, p. 106) to have held the same opinion. He "fell into the views of Unzer and Prochaska. He applied it to the passions, and maintained that joy, sorrow, fear, &c., are not excited by the Will, but felt

before the individual has so much as dreamed of them. All that passes is an arrangement produced by nature, intended for the external world, to secure "la conservation de l'animal et de l'homme, sans qu'il y ait conscience, reflexion, ni participation active de l'individu." He also asserted that *these passions, when of a certain intensity, are accompanied by actions which are independent of the Will and consciousness,* but which all tend toward the end proposed by nature, namely, the conservation and ease of the individual; *thus, in fact, classing the phenomena of the passions with the instinctive movements, and those excited by external stimuli, independently of consciousness and of the brain,* and which have been remarked on by Unzer, Haller, Prochaska, Alison, Hall, Müller, and Grainger."

Müller, who was at the time acquainted with Marshall Hall's writings, observes that "reflected motions include all muscular actions which arise from impressions on sensitive nerves exciting motor nerves to action through the intervention of the brain and spinal cord" (iii, p. 927). In this passage the brain is included in the range of reflex action.

In 1837 renewed attention was drawn, in England, to the mesmeric phenomena which attracted Hunter's notice, and which led him to the conclusion that they were due to Imagination, understood in the sense of Expectation; in short, that they could be explained on the principle that a certain state of mind induces certain bodily sensations, without charging "the subject" with imposture. Among those who investigated these phenomena with care was Dr. Laycock, who observed (v, July, 1839, p. 25) that the mesmeric subjects who two years before had attracted so much attention—the Okeys—were "of the same family as the Pythian priestess, the wizards of Kamschatka, the whirling dervishes of India, the serpent-eaters of Egypt, the second-sight men of the Highlands, the "wise men" and prophets who may still be found in Yorkshire, all knowing how to excite convulsions, or delirium, or spectral illusions and somnambulism in themselves or their dupes, by mental acts or drugs." In his 'Nervous Diseases of Women' (1840) he observes that the phenomena in these girls "were undoubtedly not feigned," but that Dr. Elliotson, in endeavouring to ascertain their cause, "appears to have overlooked the influence which the Will can exercise on

the brain, when both are habituated to the effort, and the almost incredible acuteness of the senses, and of cunning, developed in hysterical girls. It is quite a mistake to suppose that because a female appears not to *feel*, that she has not an acute sense of *touch*; or, because she cannot *see*, that she cannot most acutely *listen*." "The phenomena of Mesmerism (so called) are all illustrations of the power of the Will over the brain" (pp. 111, 355).

In the preface to his work, the author observes that "the action of the Will on the sensorial fibres of the brain, the nature and laws of sensation, the extension of the doctrine of the reflex function of the spinal cord to the encephalic ganglia, and all the consequences which necessarily follow, cannot fail, I think, to interest the intelligent professional reader, and afford matter for deep thought." And in his chapter, "The Instinctive Actions in relation to Consciousness; the Brain subject to the Laws of Reflex Action," he quotes the passage of Gall already given, and adds "the importance of these doctrines is apparent. They corroborate the truth of the proposition already laid down, that the cranial ganglia [the part of the cerebrum which may be considered as the seat of the passions], although the organ of consciousness, are subject to the same laws as those which govern the other ganglia, the diffused nervous system of animals, and the vital mechanism of vegetables." The reference here, it will be seen, is to the passions and the movements dependent on them (pp. 107, 172). The two points on which Dr. Laycock insisted, were—first, the extension of Bell's demonstration of the distinction between the motor and sentient nerves, and so "placing the sensorial fibres under the power of the Will;"* and secondly, the extension of Marshall Hall's doctrine to the brain; so "applying the laws of the excito-motory system to the phenomena, not of the spinal cord only and its prolongation, but to the brain also, and the diffused nervous system" (p. 86).

He did not overlook the importance of involuntary Attention (as well as the Will), which he classed "with the conservative

* Müller held this view also: "There is in the central organs a power of voluntarily directing the mind to all the cerebral and spinal nerves, even to the nerves of common sensation and the nerves of special sense" (iii, p. 937).

acts, or rather with the excito-motor phenomena," and illustrated it by the sensation a nervous female experiences on being pointed at, which "probably depends upon changes in the central terminations of the sensitive nerves, excited by the act of Attention."

He refers to Dr. Holland's chapter on the "Effects of Mental Attention on Bodily Organs" in his 'Medical Notes and Reflections,' 1839, in which he takes "a similar view of the subject, though led to it by a different process of inquiry," and points out that Dubois in his work on 'Hypochondriasis,' published in 1837, applied the same principle to the origin of that disease, and that Bonnet (about 1760) "maintained the views respecting the agency of Attention on the fibres of the brain which I have already advocated." Referring to Mesmerism, he adds that the phenomena will be useful in more than ever directing inquiry "to the action of Will on the sensorial fibres of the brain, and through these on the sensitive nerves, &c." (p. 112–13).

In fact, the investigations of Mr. Braid in the following year Nov., 1841, regarding the above phenomena, did throw a flood of light on the influence of the Mind upon the Body. His experiments were really a repetition, on an extensive scale, of Hunter's experiment on himself.

He induced many of these mesmeric phenomena by his own method, which, he held, owed its success to "an impression made on the nervous centres by the physical and psychical condition of the patient, irrespective of any agency proceeding from or excited into action by another" (vi, 1843, p. 32).

One sentence in his book contains the pith of the whole subject as far as relates to the influence of the Imagination or Expectation:—"The oftener patients are hypnotized from association of ideas and habit, the more susceptible they become, and in this way they are liable to be affected *entirely through the Imagination*. Thus if they consider or imagine there is something doing, although they do not see it, from which they are to be affected, they *will become affected;* but, on the contrary, the most expert hypnotist in the world may exert all his endeavours in vain, if the party does not expect it, and mentally and bodily comply, and thus yield to it."

Further, in referring to the Okeys, he says, "I have varied my experiments in every possible form, and clearly proved the power of the Imagination *on those previously impressed,* as the patients have become hypnotized or not by the same appliance, according to the result which they previously expected. This readily accounts for the result of Mr. Wakley's experiments with the Okeys" (p. 61). In subsequent publications Mr. Braid examined and explained the phenomena of "Electro-biology."* The importance of Mr. Braid's experiments and conclusions will be frequently referred to in this work.

Returning to Dr. Laycock's important contributions to cerebral physiology in connection with involuntary and unconscious mental manifestations, it should be added in chronological order that, in his paper "On the Reflex Functions of the Brain," 1844 (vii, Jan., 1845), this doctrine was brought forward "in a more physiological form," and in subsequent writings he has followed up the subject with great philosophical acumen. Dr. Carpenter has, also, by his masterly exposition of the rationale of the phenomena of Mesmerism, so far as they are due to the influence of Expectant Attention or dominant ideas, done essential service to this department of Mental Philosophy. Indeed, I suppose there is no standard physiological work which enters so fully into this class of phenomena as the fourth edition of his 'Human Physiology,' published in 1853. His full admission of the genuineness of a series of facts suspiciously looked upon by medical men and physiologists, even as late as that year, and the use he made of them as illustrations of important principles in physiology, greatly advanced their recognition. His views and those of Professor Laycock diverge on the doctrine of sensation, and it seems right to state as concisely as possible in

* Dr. Grimes, Professor of Medical Jurisprudence in Castleton Medical College, U.S., published a work in 1845 on the subject; Dr. Darling, of America, who excited much interest in it, in Edinburgh, in 1851, says this was long prior to the performance of any experiments of the kind. In 1849 the Rev. J. B. Dods lectured on Electro-biology before the Senate of the United States. Le Roy Sutherland, however, states that he was the first to exhibit these experiments at Boston, U.S., in December, 1843. Dr. Collyer puts in a similar claim. In 1845 Dr. Elliotson published some interesting experiments made on a person subjected to mesmeric manipulations, which showed the remarkable effects produced by suggestion in a susceptible state of the brain.

what this difference consists, in order that the reader may be in possession of the leading theories on this question. Writing on "Odyle, Mesmerism, and Electro-biology," Dr. Laycock observes that "one great fact proper to all is, that the action of the Will and of Consciousness is suspended, and the encephalic ganglia placed in the condition of the 'true spinal' or reflex system" (vii, Oct., 1851).* Dr. Carpenter, in his already-mentioned work, says that the point wherein he differs from Dr. Laycock is in marking-out the distinction between the "*sensori*-motor" or consensual actions, which are the manifestations of the reflex power of the sensory ganglia and the "*ideo*-motor" actions, which depend upon the reflex action of the hemispherical ganglia (viii, p. 800). Dr. Laycock, on the other hand, holds that there is no "*essential* distinction" between the sensory and hemispheric ganglia—the intelligent respondence to stimuli being common to both, quite independently of sensation or consciousness, which "in the so-called *sensational* actions takes no share causally, and is only a coincident phenomenon not necessary to the acts" (ix, 1855, p. 513). They agree, however, in the fact of "unconscious cerebration," as applied to the hemispheres, which Dr. Carpenter thus describes:—"Looking at all those automatic operations by which results are evolved without any intentional direction of the Mind to them, in the light of "reflex actions" of the cerebrum, there is no more difficulty in comprehending that such reflex actions may proceed without our knowledge, so as to evolve *intellectual products* when their results are transmitted to the sensorium and are thus impressed upon our consciousness, than there is in understanding that impressions may excite muscular movements,

* The statement that "the action of the Will is suspended" differs from the same writer's previous observation, that "the phenomena of Mesmerism are all illustrations of the power of the Will over the brain" (p. 8). To some extent this is accounted for by there being an early or voluntary, and a later or involuntary, stage of artificial somnambulism. No doubt, however, the prominence given by this writer to the action of the Will on the sensorial fibres of the brain in 1840 has been supplanted, to a large extent, by the fully developed doctrine of the brain's automatic action. Instead of speaking of the influence of the Will in mesmeric subjects, like the Okeys, he would now refer the phenomena they exhibited to the action of the brain, involuntarily excited by the attention being directed in certain channels by the suggestions of the operator.

through the 'reflex' power of the Spinal Cord, without the necessary intervention of sensation. In both cases the condition of this form of independent activity is, that the *receptivity* of the Sensorium shall be suspended *quoad* the changes in question, either by the severance of structural connection, or through its temporary engrossment by other objects" (viii, p. 819).

The reader can hardly fail to remark incidentally, from this sketch, how powerful a stimulus has from time to time been given to the study of psycho-physical facts by peculiar conditions of the nervous system, artificially induced * and usually denominated mesmeric. The author believes that this mine is far from having been exhausted, and that, more systematically worked, it will well repay the cerebral physiologist.

Glancing broadly, in conclusion, at the whole range of psycho-physical phenomena, it is clear that it would be taking a very contracted view of the relations between Mind and Body if we did not include in this relationship, a reference to the inseparable *nexus* existing between the two, arising out of the fact that the organ of mind is but the outgrowth and ultimate development of the tissues and organs of which the body itself is composed; that it not only unites them in one common bond, but is, in truth, a microcosm of the whole. It is a fine expression of Swedenborg's (a man who, through all his mysticism and mistiness, recognised some great truths) that the likeness or image of the greatest is represented, as in a mirror, in the least, and of the least in the greatest, and he adds, "nor can anything be turned over *in the mind* that, if it please, may not be portrayed *in the extremes,* by means of the fibres; for instance, in action by the muscles. Nay, the very minds and inclinations or affections that excite the principles, shine out upon the face of actions, and gleam through, however they are concealed; showing that *the fibre is the cerebrum continued.* . . . . . There is a likeness of the brain in every fibre. The fibres carry with them the animus of the brain. . . . . Cerebrum and cerebellum are universally present in the body by means of the fibres" (xxxii, vol. i, p. 476, &c.). By a very

* The application of these facts to mental diseases is attempted in my Essay entitled "Artificial Insanity," in the 'Journal of Mental Science,' April, 1865.

different route he arrives at a conclusion which does not materially differ from that of the modern school of physiologists. If, then, the development of the minutest germ or cell in the body be a representation of the same principle that works in the formation of the organ of mind; if this organ consists of, and is an outgrowth from, such cells; and if the brain be the grand centre which is in immediate relation with the structures and tissues which have preceded it, then, although these continue to have their own action—that which they had before the brain was added, or have in animal life where no nervous system exists—the organ, one of whose functions is centralization, combination, or co-ordination, must be expected to act upon the Muscular tissue, whether striped or unstriped, the Organic Functions, and, through the blood-vessels, upon the vascularity and innervation of the Sensory Ganglia.

SECTION II.—Of various Mental States comprised under the Intellect. Definition and Elucidation.

Before proceeding to special Cases, illustrative of the influence of the Intellect on the body, we shall endeavour to state clearly what we include under the term.

The use of the *intellectual powers* generally, falls under this division, and involves mental application, hard study, or concentration of thought. The *Attention*, which, as we have already seen, plays so remarkable a part in the operations of the mind in its relation to the physical phenomena presented to our notice, will be included under this head also, although, in one form, an act of the Will.

Ideas (ἰδέα, from ἰδεῖν, to see or know) either arise from and succeed to the perception of the impressions made upon the senses, or they arise, without any external stimulus, from Memory, or Imagination, and constitute representative images. They derive greatly increased force from the steady direction of the Attention to them.

The term Idea has been employed in so many senses, from the days of Plato, the reputed originator of the word, to the present time, that it will not be amiss to add to the foregoing,

a brief reference to some of the significations attached to it. Abstract notions, such as "Virtue," Plato, like ourselves, called ideas. The abstract, has as much existence as the concrete, man. According to Lewes, our conceptions, which Realists regarded as perceptions, of existing things, he termed ideas; the only real existences, the *noumena* of which all individual things are the *phenomena*. "If, then, we define the Platonic idea to be a Noumenon or Substantial Form, we shall not be far wrong. . . The phenomena which constitute what we perceive of the world (*i. e.* of Sense) are but the resemblances of matter to ideas. In other words, ideas are the forms of which material things are copies—the noumena of which all that we perceive are the appearances (phenomena)" (L). It is in the sense of an abstract notion that Aristotle remarks, "The philosopher is occupied about ideas (*ὁ φιλοσοφος περι τὰς ἰδέας σπουδάζει*)." Donnegan says that Greek writers attached to the word the signification, not only of an original mental representation, but of the form or external appearance and image of an object. Latin writers employed, as synonymous with *ἰδέα*, "species" (from *specio*, I see), the term referred to by Cicero (Acad. i, 8):—"Mentem volebant rerum esse judicem: solam censebant idoneam, cui crederetur, quia sola cerneret id, quod semper esset simplex et uniusmodi et tale, quale esset; hanc illi *ideam* adpellabant, jam a Platone ita nominatam: nos recte *speciem* possumus dicere." Still, Cicero uses "Idea" in the sense of a mental image or notion (Tusc. i, 24, post med.). He also uses "species" in the sense of a dream (Acad. iv, 17), "Eadem est in somniis species eorum, quæ vigilantes videmus;" corresponding to the "nocturnæ species" of Livy. The "species" of the Schoolmen* perpetuated the material doctrines of the Peripatetics. Unzer, in employing the term "material idea," protests that by it he understands "no hieroglyphical figures of the objects of the conceptions, no

* "The philosophy schools teach that for the cause of vision the thing seen sendeth forth on every side a visible species; in English, a visible show, apparition, or aspect, or a being seen, the receiving of which into the eye is seeing. . . . . Nay, for the cause of understanding also, the thing understood sendeth forth an *intelligible* species, that is, an intelligible being seen, which, coming into the understanding, makes it understood." (Hobbes, 'Of Man,' pt. i, c. i.)

impressions stamped on the medullary substance" (i, p. 26). Descartes, according to Reid, demolished the system of Aristotle and his followers; Reid attacks that of Descartes; and Sir W. Hamilton asserts that Reid wholly misunderstood Descartes. Hamilton also says that Locke misunderstood Descartes, and that Reid failed to comprehend Locke! Locke's classification of ideas essentially consists of those which arise from sensation, those which spring from reflection, and, thirdly, notions or mixed modes; while, with Kant, an idea represents any conception formed by the reason, and is altogether beyond sensorial perception. With Brown and his followers, ideas, thoughts, and notions are, alike, nothing more than the Mind itself in different states, in other words, the Mind's conception of an object of thought.

James Mill observes, "I see a horse; that is a Sensation. Immediately, I think of his master; that is an Idea. The idea of his master makes me think of his office; he is a minister of state; that is another Idea." This idea of the horse's master constitutes, according to his view, the image, copy, representation, or trace of a sensation. It is simply the state of mind which exists in relation to an object once present, but now absent. It has been objected, however, that the idea immediately formed by a present sensation is not here recognised, being entirely merged into the sensation itself, and that there are ideas or notions excited by external impressions which may be distinguished from sensations, although the idea and the sensation are closely allied. The idea of a griffin, or of nobleness, piety, or democracy, form examples of Mill's "mental ideas" (the mixed modes of Locke), and are not transferable to sensations. Mill observes that such ideas are put together chiefly at our discretion, but his editor (J. S. Mill) points out that this is only true in cases of Invention—creative Imagination, *e. g.* a centaur, or a mountain of gold. On the contrary, such mental ideas as temperance, meanness, &c., "are supposed to have real originals outside our thoughts," and are not mere creations of Imagination any more than complex sensible ideas (xxix, I, pp. 52, 70, 142).

Then there is the deeper aspect of the subject of ideas, or of ideational changes, suggested by modern doctrines of evolution. This carries us much further back; in short, to life itself—to

those (ordering-force-to-ends) ideas of life and organization, which Laycock calls teleiotic. They are, from this point of view, causes of the phenomena of Nature, growth, development, instinct, consciousness, thought, but only energetic, as derived from the Supreme Thought of Creation—the Great First Cause of all things. Milton speaks of the Creator, with poetical licence of expression, desisting from his work to behold the world—

> "how it shew'd
> In prospect from his throne; how good, how fair,
> Answering his great IDEA."

Any one of these biotic ideas, which in unconscious organisms results in form and function only, becomes, in conscious organisms, "realised as a representation to the consciousness, or rather is itself realised as a state of consciousness,"—a noetic idea (lvii, p. 63). This is what is usually called a cognition, notion, or idea. This doctrine of correlative biotic and noetic evolution is the basis of mental organology in this system. Thus, the chiseling of the Laocoon, and the development of the living original, are alike the result of the same idea; the former with, the latter without, consciousness; the sculptor guided by "an ideal intuition of genius;" the growth of the living form, by "an archetypal idea of development."

Imagination, which is comprised under this division, has been referred to, when speaking of those ideas which arise without any present external stimulus. As the involuntary memory (almost spectral) of an object after its removal, Milton employs the word in 'Samson Agonistes,' when the messenger enters, in hot haste, to relate the catastrophe at Gaza:

> "Whither shall I run, or which way fly?
> The sight of this so horrid spectacle,
> Which erst my eyes beheld, *and yet behold!*
> For dire *imagination* still pursues me."

The term is often used simply in the sense of active memory —Recollection. Thus, we sometimes speak of a certain taste being imagined, that is, recalled; but more usually it is applied, as by James Mill, to those ideas or clusters of ideas which, in their combined form, have not at any time been present to the

senses; or to the separation of classes of facts into their constituent elements, and combining them afresh, so as to form unreal representations, or scenes which have no existence—the sense in which Abercrombie employs it. If we combine Memory, the faculty by the operation of which we form an idea or image which is, and Imagination, the faculty by which we form an idea or image which is not, a copy of a previous impression, we may conveniently speak of recollective and creative Imagination. In the former, to employ Professor Laycock's terminology, "substrata are re-awakened into activity by affinitive impressions, and it follows the law of association of ideas;" in the latter, "forms and successions of events, not to be met with in the external world, may be developed." Common to both forms is the presence of an idea not immediately excited by any material form answerable thereto. As contrasted with the wide medical use of the word to which we shall shortly refer, this state might be termed Imagination proper. Nor would this be inconsistent with its derivation. Imaginatio, or Imago, a re-presentation to the mind, really means an imitation (*imago ab imitatione dicta*, Festus), and is traced back to εἴγμα (from ἴκω, to resemble), an image. Tacitus uses imaginatio in the above sense (Ann. xv, 36). Imago is employed by Virgil (Æn., ii, 560), to signify a mental image or likeness:

"Obstupui: subiit cari genitoris imago."

Both imago and imaginatio are used in the sense of dreams, the former by Ovid, "imago noctis" (Met., ix, 473), and the latter by Suetonius, "imagines somniorum" (Calig. I). As a form, it is employed by Virgil (Æn., ii, 360):

"Ubique pavor et plurima mortis imago."

Imago is used by Plautus to signify the impression made upon a seal: a favourite metaphor for mental images.

The Greek synonym of imaginatio, φαντασια, from which our words Fancy and Phantasm are derived, signified the beholding of objects by the power of Fancy, or creating new objects by the Imagination. Quintilian, interpreting the word as used by Aristotle, says "per quas, imagines rerum absentium ita repræsentantur animo, ut eas cernere oculis ac præsentes habere

videamur." This is Hallucination, answering to our Phantasm, and not Fancy as now employed, which does not go beyond an exaggerated degree of Imagination—creating what is "furthest removed from nature, fact, or sober reality" (Bain).

The Imagination, which in its broad medical sense is, when properly understood and guided, a complex mental power of the greatest interest and importance, must be considered under this section, although passing insensibly into emotional states.

In reference to the difficulty of separating emotional and ideational states of mind, Herbert Spencer takes the case of perceiving a beautiful statue or even an ellipse or parabola, and points out the manifest impossibility of disentangling the cognitive from the emotional element.*

With this form of Imagination are closely associated Expectation, Belief, Faith, Imitation, Sympathy, and Hope, some of these states involving the feelings more than others. The most superficial examination of the sense in which the term "Imagination" is employed by metaphysicians on the one hand, and popularly and medically on the other, will reveal the wide difference which exists between the two. In truth, as regards the present inquiry, it signifies, in popular and medical language, that a man imagines certain (bodily) phenomena to have occurred which have not; or it is meant that certain bodily phenomena which really have occurred, are due to no other cause than that he imagined they would. The signification of the term contained in the first clause is too often assumed to be the whole truth. That of the second clause is almost, if not altogether, lost sight of. Because effects are produced and cures performed by means of a mental condition called the Imagination, it is constantly assumed that these results are imaginary, in other words, that they are "all fancy." This is much to be deplored,

* "The materials dealt with, in every cognitive process, are either sensations or the representations of them. These sensations, and, by implication, the representations of them, are habitually in some degree agreeable or disagreeable. Hence only in those rare cases in which both its terms and its remote associations are absolutely indifferent can an act of cognition be *absolutely* free from emotion. Conversely, as every emotion involves the presentation or representation of objects and actions; and as the perceptions, and, by implication, the recollections of objects and actions, all imply cognitions; it follows that no emotion can be absolutely free from cognition" (x, vol. i, p. 475).

and one of the objects we have in view is to dispel, as far as possible, so mischievous an error. It is generally implied that these phenomena are of a merely functional, subjective character, more or less dependent on the state of the mind, more especially the Will, and that a change of mental condition has been naturally followed by a change in the phenomena, although apparently physical. Such is the broad definition of the Imagination, as it presents itself to the mind, when employed in reference to medical facts of every day occurrence. This is what the orthodox medical practitioner means, as he complacently smiles, or is indignant, when the success of his heterodox rival is dinned into his ears, and he asserts that it was all the effect of the Imagination; and, in this sense, he is understood by his assailant. But the fact remains, and because it remains, and cannot be really explained-away, it must be explained. The essential must be separated from the accidental, and utilised for therapeutical purposes. It matters little to the patient by what name the remedy is called, whether "Imagination," or some of the many "pathies" of the day. It is emphatically a case in which "a rose by any other name will smell as sweet." But to the philosophical practitioner it ought to matter a great deal; it ought to be a question of exceeding interest.

It is obvious, then, that such signification of the term is widely different from that in which it is employed by metaphysicians and (yet more so) by writers like Mr. Ruskin, who assigns to it a deeper meaning. On analysing the mental states comprised under the medical and popular use of the term, it will be found that the Attention is strongly directed to a part of the body with which certain phenomena are associated, that the ideas most vividly presented to the mind are in direct relation to them, and that the force of these ideas is intensified by accompanying states of mind already referred to—Expectation, Hope, or Faith. When a person on swallowing a bread-pill, in the belief that it possesses aperient properties, is purged, it is said to be through his Imagination; the mental condition present yielding, on analysis, a definite direction of thought to the intestinal canal; such leading idea exciting the same peristaltic action as would have been induced by castor oil. The force of

this current of thought is augmented by Expectation. The other day a lady nurse, at the Plymouth Hospital, told me of a patient in one of the female wards, who was much disconcerted at the doctor having left the hospital without ordering an aperient pill, as he had intended to do. The nurse procured a bread-pill, and satisfied her mind. Next day she found, on inquiry, that it had answered its purpose satisfactorily. Again, I hold a ruler in my hand, and point it to a painful region of the body of a patient, who entertains the opinion that I am about to relieve the pain. The patient imagining that the ruler will be the means of curing her, believes in a force which does not exist—a curative power passing from the ruler to the body—and is relieved. That she is relieved is no Imagination. What cured her? Merely to say it was the Imagination is no solution of the problem. What really happened was that her attention was arrested and forcibly directed to the part, the prominent idea being the firm conviction that the morbid symptoms would pass away. In other cases the fixed idea may be, on the contrary, that certain phenomena will occur; that there will be pain, or redness of the skin, or loss of muscular power, and should these supervene, we say, as before, it was due to the Imagination. This medical use of the term has for its basis that thinking upon an object which, as Dugald Stewart points out, is used by Shakespeare as synonymous with the Imagination, when he speaks of "thinking" on the frosty Caucasus, the "apprehension" of the good, and the "Imagination" of a feast. It is the "conception" of Stewart himself. "The conception of a pungent taste, produces a rush of saliva into the mouth; the conception of an instrument of torture applied to any member of the body, produces a shock similar to what would be occasioned by its actual application." This is recollective Imagination, and merely involves the presence of a mental image of an object not present to the senses, but in the wider medical use of the word it becomes, as already stated, more complex, although by no means embracing the Imagination of those metaphysicians, with whom (Stewart, for example) it includes, not only conception or simple apprehension, but abstraction, "which separates the selected materials from the qualities and circumstances which are connected with them

in nature, and Judgment or Taste which selects the materials and directs their combination." To these powers the above-mentioned metaphysician adds, Fancy.

Mr. Ruskin pronounces this definition meagre, and says the very point is missed, for he omits from it the power of prophecy, which is the essence of the whole matter. The composition which Stewart regards as Imagination has no part or lot in it. Such a composer only copies the remembered image; with Ruskin, it is a penetrating faculty, reading truths, discoverable by no other faculty, as well as a combining associative power, which creates new forms, and one which regards simple images and its own combinations in peculiar ways. It is greatly dependent on acuteness of moral emotion. In its highest form, it is "altogether divine," and out of an infinite mass of things, seizes two that are fit for each other, and are together right, although disagreeable alone. "It is the grandest mechanical power that the human intelligence possesses, and one which will appear more and more marvellous the longer we consider it." It is an operation of mind "altogether inexplicable," and can only be compared with chemical affinity. But it is not necessary to refer further to this aspect of the Imagination; enough has been said to show that the various significations attached to the term, must not be allowed to mislead us, and that we are not concerned with the faculty understood in the Ruskinian sense, that in which it is used in reference to the painter, the faculty "necessary for the production of any great work of art." Fancy a country practitioner who has had a truant patient cured by a globulist, and has retorted that he or she was relieved only by the Imagination, being informed that it was by the "power of prophecy;" that the method so far from being contemptible, was "altogether divine," and, in short, the "grandest mechanical power" belonging to man's intelligence! The only point in which he could agree with Mr. Ruskin would be that it was, indeed, "altogether inexplicable."

This eloquent writer's distinction between Fancy and Imagination is, however, too fine to be omitted. The former he characterises as "one of the hardest-hearted of the mental faculties, or, rather, one of the most purely and simply intellectual. Fancy is never serious; Imagination cannot but be

serious. Imagination is quiet; Fancy restless." It is with him almost identical with simple conception, for he says "it sees the outside, and is able to give a portrait of the outside, clear, and full of detail;" while "Imagination sees the heart and inner nature," though obscure in outer detail. "Fancy plays like a squirrel, in its circular prison, and is happy; but Imagination is a pilgrim on the earth, and her home is in heaven" (xii, vol. ii). Clearly, however, from a practical medical standpoint, Fancy and Imagination are used synonymously.

Returning, now, to the basis of the Imagination, simple *imaging*—for, as we have said, the fundamental element is a psychical representative image—we are concerned with what are ordinarily called ideas which the mind conceives, and which may or may not be actual copies or reproductions of external objects. With ideas as they arise simply from the perception of impressions on the senses, we have not now to deal. As James Mill observes, it is an inconvenience that the word Idea is used with so much latitude of meaning; and, with him, when we employ the term "Ideation" we do so as a general term opposed to Sensation. As sensation may be intensified by various favouring circumstances, so, also, may ideation or imaging acquire intensity from Attention, Desire, Faith, &c., and then we have Imagination in its complex as distinguished from its pure and simple form of Imaging. Further, ideation immediately acts upon sensation, as sensation acts upon ideation; and from our present position, it is this and its influence upon motion which constitute such important facts. Mere remembrance of a sensation is, no doubt, in general, greatly inferior in intensity to the original impression on the senses, in fact, differs mainly in this particular; but, as we shall subsequently show, ideation, under certain circumstances, is, in its influence on the sensorium, as powerful as anything, in the outer world, which impresses the senses; and may be really more so, because in the states referred to, there is no disturbing element to distract the attention. Mr. Bain remarks that a certain pleasing remembrance attaches to a good dinner, but how far below the original! We are prepared to maintain, however, that in the above-mentioned states, an ideal dinner would be as pleasing as a real one, so far as present sensation is concerned. In the example of the

fictitious pill, an idea is suggested by it to the mind which recalls the sensation experienced on a former occasion when a real pill was taken; this central sensation (which is referred to the peripheral terminations of the sensory nerves of the intestines) is reflected on to the motor nerves supplying the muscular walls of the alimentary canal, and they contract in consequence. It is true that, in *most* instances, the effect produced would not be so sure, or so great, as when the action of the intestinal muscles is directly excited by purgatives. If, however, the system be placed under the influence of Braidism, the action excited from the centre, would be more likely to equal, in intensity, that excited at the periphery.

The various ways in which vomiting may be excited, will serve to illustrate the influence of ideas presented in different forms. See how the causes differ. First, a man may vomit from taking an emetic, from a bad smell, or from visceral disease. With this class of cases we have nothing to do; the mind has not influenced the body. Secondly, he may vomit from receiving unpleasant intelligence. Thirdly, by seeing or hearing another person retch; from Sympathy, as we say. Lastly, this effect may be induced by the belief that an emetic has been taken; from Imagination, in the ordinary sense of the term current among men. In the second instance, the proximate cause is emotional in character, and does not fall under the present division. In the two succeeding examples, the observations already made as to simple ideas, and ideas around which cluster other mental principles, as Expectation and Belief, so as to form a complex state popularly known as Fancy or Imagination, receive as good an exemplification as we could desire. Belief in an event about to happen was absent in the third, and present in the fourth illustration. How much the effect of even disagreeable things depends upon our knowing that they are so, is shown in everyday experience; and the cause is referred by general consent to the Imagination.

> "There may be in the cup
> A spider steep'd, and one may drink; depart,
> And yet partake no venom; *for his knowledge*
> *Is not infected;* but if one present
> The abhorr'd ingredient to his eye, make known
> How he hath drunk, he cracks his gorge, his sides,
> With violent hefts:—I have drunk and seen the spider!"

Lord Bacon, in his 'Natural History,' has a section entitled "Experiments in consort touching the emission of immaterial Virtues from the Minds and Spirits of Men, either by Affections, or by Imaginations, or by other impressions," in which, among a good deal that is fanciful, there are several characteristically acute observations. He defines Imagination as "the re-presentation of an individual thought," and says it is of three kinds; the *first*, joined with belief of that which is to come; the *second*, with memory of that which *is past*; the *third*, is of things present, or as if they were present. Of these, the first answers to what we have spoken of as Expectation (or Expectant Attention); the second may be illustrated by the effect of the remembrance of a delicious peach in making the mouth water; the third has reference, merely, to fanciful representations.

The power of the Imagination Bacon also considered under three heads: first, that exercised upon the body of the imaginant; the second, upon dead bodies, as plants and metals; the third, upon the spirits of men and living creatures. Of these, the first alone is embraced by our survey. Bacon, it may be added, oppressed by the difficulties of the investigation, complains that "the inquisition of this subject in our way, which is by induction, is *wonderful hard!*"

The intensity of Ideas is, as we have said, greatly increased by the belief, faith, or expectation that certain phenomena will occur, and powerfully affects the body for good or ill, according as it is associated with Hope or Fear. Indeed, Hope is usually involved in medical Faith; Fear is not. Both are frequently allied with Expectation and Belief. Expectation is a belief in the future; if of a favorable character, it constitutes Hope; if unfavorable, Fear. Hope and Fear, according to Wundt, are special forms of Expectation, containing an element of the indeterminate; Hope is the expectation of a wished-for event; Fear, the expectation of one not wished for. It is an apt description of his, that Expectation is the hurrying forward of the thoughts into the future. There may be the expectation of a muscular movement, or of a sensation, or that certain organic changes in the direction of health or disease will occur. As the influence of ideas is so largely determined by their hopeful or fearful character, the emotional element will constantly crop

up in the consideration of the Imagination, just as under the head of emotional influence, the illustrations of the effects of Fear must also represent Expectation, seeing that Fear is the apprehension of evil. Bain, who defines the primordial form of Belief as expectation of some contingent future about to follow on our action, holds that James Mill erred, in common with most metaphysicians, in calling it a purely intellectual state. On the other hand, the distinctive character of the belief, from an intellectual point of view, must not be lost sight of, for it is not simply that a fearful Belief will affect the bodily functions, but that the expectation of the form which it will take will determine, more or less definitely, the particular character of the affection.

When Belief is intense, we say there is Confidence; Doubt is excluded, and Faith is all-powerful. The Imagination has risen from a mere idea, image, or conception, to an irresistible conviction; the very mental condition which, from a medico-psychological point of view, is the *desideratum*, in undertaking the treatment of diseases admitting of amelioration from the psychical method. The word Imagination is sometimes employed in too comprehensive and lax a way, and the emotions made to enter into its composition to an unwarrantable extent. This is, perhaps, more particularly the case when its evil rather than its beneficial aspect is dwelt upon. The old French Commission on Animal Magnetism, for example, observe, "As to the Imagination, we know the derangement which a vivid and sudden impression has often occasioned in the human machinery. The Imagination renews or suspends the animal functions; it animates by Hope, or freezes by Fear; in a single night it turns the hair white; in a moment it restores the use of the limbs or the speech; it destroys or developes the germ of diseases; it even causes death."

There are two terms frequently made use of to which it will be convenient to refer here—Sympathy and Imitation.

Fundamentally identical, the former, both in etymology and usage, refers especially to Feeling, while the latter is employed in relation to Action. There is the sympathy with both forms of Feeling—the mental and the sensational. The influence upon sensation of a mind *en rapport* with another mind illus-

trates both effects. One who sympathises strongly with another who is suffering from bodily pain, is very likely to experience it himself. The emotional element usually enters strongly into this condition, but there may be what is termed sympathetic pain, when the knowledge, abstract idea, or conception is alone sufficient to induce corresponding bodily sensations, without any excitement of emotional sympathy. At this point it really merges into Imitation. For with both it is this knowledge or apprehension of another person's state which, more or less involuntarily, causes similar actions, as expression, gesture, and the tone of the voice. A vivid image is formed in the mind of a phenomenon occurring to another. This is reproduced in the spectator. The event is in accordance with the general law now under consideration. If John gapes when he sees Thomas gape, it is because the idea is forcibly presented to his mind, and thus produces analogous acts. The idea is in this case excited through the senses of sight or of hearing; but it may be suggested in other ways, as when John simply thinks of the act and the same effect is produced, as has happened to myself from writing this sentence. Here we meet the additional principle, that whatever mental or bodily state can be excited through the senses from without, may arise from within, from Imagination proper. All these sympathies come into play when we only imagine ourselves, as well as when we are really, acting on the stage of life. It is this principle, well known to psychologists, but so often overlooked by the public, which continually turns up in the consideration of the questions now engaging our attention; and both principles united serve to form a clue to many, otherwise inexplicable, bodily manifestations, the effects of mental states. Imitation is closely allied with phenomena popularly referred to the Imagination; with those remarkable psychological dramas which have at various epochs arrested the attention of the world. To this remarkable principle of our nature which leads us to act involuntarily like others, the convulsions and faintings, which, in sensitive persons, follow the witnessing of these conditions, are due. As regards the Imagination and Imitation, while so closely allied from this point of view, the philosopher sees in these states antagonism rather than relationship. He perceives that the Imagina-

tion expands and indefinitely extends the objects of perception or thought; while Imitation merely reproduces, and is limited by the boundaries of actual facts. The Imagination, if it does not create, combines old forms until new ones arise; the Imitation faculty does not invent, it only copies. They bear, in this aspect, the same relation to each other that the painter and the engraver do. Both are essential to the well-being of the individual and of the community. Without Imagination the world would be a desert, devoid of even its mirage; a barren present without future hopes. Without Imagination the lover and the poet, according to a high authority, could not exist. Without Imitation the child could not grow into the man. Without Imitation the acts of daily life, known as "habits," originating in unconscious mimicry, would be fresh inventions or discoveries in each individual.* From our present practical standpoint, however, Imitation is rather the result of an idea excited from sensorial impressions, or of the imagination. It involves a reflection or bodily counterpart of a mental image. When people say that a hysterical girl has her imagination vividly impressed by the contortions of a patient, and becomes similarly affected, the psychologist affirms that a vivid image was excited in the mind, and that, by the law already laid down in regard to Imitation or Sympathy, the spectator's body assumes the same state as that of the patient. The physiologist's mode of expressing the like event, is that the idea excited by the scene passed from the hemispheres down to the motor ganglia and nerves, and so a corresponding ideo-motor act resulted.

In concluding this Section it may render the relation between Sensation and Ideation clearer to employ a familiar illustration. I perceive an object, the sun, for example. An image is formed on the retina, which is transmitted by the optic nerves to the brain. These processes ensure sensorial perception, or object-consciousness. But there is more than this; there is a

* The writer believes he has seen the analogies and antipathies of these two states ably worked out, but cannot recall the work. If in this or any other instance he has been indebted, without acknowledgment, to previous authors, he should feel obliged to any of his readers who will point out the source to which he is indebted.

mental impression, involving subject-consciousness. The whole complex state is included in Sensation by Mill, and also by Bain, who regards the subject state as Sensation proper. But the condition of my mind when I perceive the sun may be considered to involve ideational as well as, and excited by, sensorial changes; including, in short, the mental state, which, as an idea, remains after the external object or stimulus is withdrawn. A change has been induced in the gray matter of the hemispheres by the upward action of the sensory ganglia excited by impressions from without, so that we have three distinct though continuous portions of the nervous system acted upon: the peripheral expansion of the optic nerve on the retina, the corpora quadrigemina, and the hemispherical ganglia.

After ceasing to perceive the sun I retain, then (apart of course from the spectrum which may remain for a short time after closing my eyes), a state of mind in relation to it which constitutes an idea—the immediate result of an external object, one which passing away from the consciousness may become latent. This by active Memory or recollective Imagination may be recalled, or by creative Imagination may be united with other ideas and formed by its "esemplastic" power into one mental image. The vexed question of the nature of the recollection of sensations, in idea, will be referred to in the next Chapter.

CHAPTER II.

INFLUENCE OF THE INTELLECT ON SENSATION.

The Intellect may excite ordinary Sensations, may suspend them altogether (*anæsthesia*), or may induce excessive and morbid Sensations (*hyperæsthesia* and *dysæsthesia*). The terse, but comprehensive expression of John Hunter, which has already been cited, contains in a nutshell the principle which underlies the greater part of the phenomena referred to in this section. "*I am confident that I can fix my attention to any part until I have a sensation in that part.*" Müller expresses the fact of the operation of the ideational upon the sensational centres in equally clear terms. "Ideas do not act merely on the motor apparatus by which they are expressed; they as frequently affect the organs of sense, which then present sensorial impressions or images of the ideas." Among other proofs he gives the instance of a person's teeth being set on edge by witnessing another about to pass a sharp instrument over glass or porcelain; also the production of shuddering by the mentioning of objects which, if present, would excite that sensation; that is, by recollective Imagination. "I cannot think of seeing a slate rubbed with a dry sponge," remarks Herbert Spencer, "without there running through me the same thrill that actually seeing it produces."

If twenty persons direct their attention to their little fingers for five or ten minutes, the result will probably be something like this: A few will be unconscious of any sensation in this member; some will experience decided sensations—aching, pain, throbbing, &c.; and the majority will feel a slight sense of weight and tingling. This simple experiment raises several questions, as, Might sensations always be felt in the part,

from the changes which are constantly going forward in the tissues, but are unobserved except when the attention is directed to them? Or, does the act of Attention excite increased vascularity of the sensory ganglia, and cause subjective sensations? Or, lastly, do the sympathetic centres become excited, and the vaso-motor nerves influenced, so as to cause temporary vascular changes in the finger which involve sensation? The first supposition does not seem probable, except to a very slight extent. If correct, we should always feel some sensation in the finger when consciousness is directed towards it. We think both the remaining suppositions have weight. Probably the feeling experienced is partially subjective; but we believe there is a real effect produced upon the finger if Thought is sufficiently long directed to it, and that these vascular changes are felt in the form of throbbing, weight, &c. Others are more likely to be subjective.

Mr. Braid tells us in his little book on 'Hypnotism' (xx, p. 93) that he requested four gentlemen, in good health, and from 40 to 56 years of age, to lay their arms on a table with the palms of their hands upwards. Each was to look at the palm of his hand for a few minutes with fixed attention, and watch the result. Entire silence was enjoined. What happened? "In about five minutes, the first, one of the present members of the Royal Academy, stated that he felt a sensation of *great cold* in the hand; another, who is a very talented author, said that for some time he thought nothing was going to happen, but at last a *darting, pricking* sensation took place from the palm of the hand, as if electric sparks were being drawn from it; the third gentleman, lately mayor of a large borough, said that he felt a very uncomfortable sensation of heat come over his hand; the fourth, secretary to an important association, had become rigidly cataleptic, his arm being firmly fixed to the table."

It would be difficult to determine in these instances by what train of thought these different results came to pass; whether each imagined that such and such effects would be produced by the process, or whether an accidental condition of the hand at the moment, caused certain very slight suggestions, which were intensified by the Attention directed to them. Probably the

former; but one thing is certain, that had Mr. Braid suggested other effects, instead of preserving silence, the character of the sensations would have been greatly modified.

The individual under the influence of "Electro-biology," persuaded that he is in danger of being lost in the snow, shivers with imaginary, but to him no less real, cold. Adopting the expression which the Tichborne trial has rendered so proverbial, we may say that Shakespeare would have been "surprised to learn" that a man can hold a fire in his hand by thinking on the frosty Caucasus, and, conversely, can

> "Wallow naked in December snow,
> By thinking on fantastic summer's heat;

for a central sensation of ideal or subjective origin, can forestall or supplant the sensation derived from a peripheral impression.

Professor Gregory reports one of those frequent cases in which, by suggestion, "the subject" experiences a variety of sensations. "One arm was deprived of sensation, or both arms, or the whole frame. He was made to feel a knife burning hot, and the chair on which he sat equally so. When he started up, he was made to feel the floor so hot that he was compelled to hop about, and wished to pull off his boots, which burnt him. He was made to feel the room intolerably warm, and actually perspired with the heat; after which he was made to feel it so cold, that in a minute or two he buttoned his coat, and walked about rubbing his hands. In about five minutes his hand was really chilled, as I found, like that of a person exposed to frost" (xix, p. 353).

Mr. Braid in investigating the alleged discoveries of Reichenbach in regard to the Od force, found that in nearly all cases, even when the persons had not been hypnotised, drawing a magnet or other object slowly from the wrist to the point of the fingers produced various effects. Among these were "a change of temperature, tingling, creeping, pricking," while, when he reversed the motion, "it was generally followed by a change of symptoms *from the altered current of ideas then suggested.* Moreover, if any idea of what might be expected existed in the mind previously, or was suggested orally during

the process, it was generally very speedily realised. The above patients being now requested to look aside, or a screen having been interposed so as to prevent their seeing what was being done, if they were requested to describe their sensations during the repetition of the processes, similar phenomena were stated to be realised when there was nothing whatever done beyond watching them, and noting their responses." His son, Dr. Braid, who assisted his father in his experiments, remarks in a letter to the author a few years ago, "certainly the first results would have misled any one who was not accustomed to sift such matters." Mr. Braid gives the case of a lady, above 56, who had, when young, been a somnambulist, but in perfect health and wide awake when the experiment was tried. Having been placed in a dark closet, and desired to look at the poles of a powerful horse-shoe magnet and describe what she saw, she "declared, after looking a considerable time, that she saw nothing." However, after Mr. Braid told her to look attentively, and she would see fire come out of it, *she speedily saw sparks,* and presently it seemed to her to burst forth, as she had witnessed an artificial representation of the volcano of Mount Vesuvius at some public gardens. Mr. Braid then closed down the lid of the trunk which contained the magnet, but still the same appearances were described as visible. "By putting leading questions, and asking her to describe what she saw from *another* part of the closet (where there was nothing but bare walls), she went on describing various shades of most brilliant coruscations and flame, according to the leading questions I had put for the purpose of changing the fundamental ideas. On repeating the experiments, similar results were repeatedly realised by this patient. On taking this lady into the same closet after the magnet had been removed to another part of the house, she still perceived the same visible appearances of light and flame, when there was nothing but the bare walls to produce them; and two weeks after the magnet was removed, when she went into the closet by herself, the mere association of ideas was sufficient to cause her to realise a visible representation of the same light and flame" (xxiii).

Attention directed to the stomach notably causes a sensation of weight, aggravating or even originating dyspepsia. Dis-

comfort, a sense of tension, and other forms of sensation may, every one knows from experience, be induced in the several abdominal organs.

Probably no simpler example could be given of the morbid effect of Imagination on the body, in its recollective form, than the following common occurrence :—A child says, "thinking of that powder almost makes me sick." In fact he experiences nausea from no physical agent, but solely from the representative idea thereof in his mind. But for our familiarity with the fact, it would greatly surprise us that such should be the case.

Squeamishness is frequently caused by Attention and by other allied mental states. Marshall Hall mentions a person who could not attempt to untie a small knot without a sense of nausea.

We witness in the following instance the curious effect of what is usually called Association of Ideas. Dr. Kellogg records, in the 'American Journal of Insanity,' the case of a friend of his who informed him that he had frequently sailed when young in a steamboat across an arm of the sea which was rough, and in consequence often suffered from sea-sickness. Upon this boat was an old blind fiddler, who did his best to alleviate the sufferings of the passengers with his violin. The result was that this instrument became associated in his mind with sea-sickness, and for years he could never hear it without experiencing sensations of nausea or a sort of *mal de mer*. Van Swieten's case of vomiting, which will be given under involuntary muscular action, might also be, as correctly, cited here.

Gratiolet (xv, p. 297) relates of himself that when a child his sight became affected, and he was obliged to wear spectacles. The pressure which their weight exerted upon the nose was so insupportable that he was obliged to discontinue their use. Writing twenty years after, he says that he never sees any one wearing spectacles, without instantly experiencing very disagreeably the sensation which had so much disturbed him as a boy.

Then as to actual pain caused by mental states, Sympathy, Expectation, &c., the most familiar instance is that of toothache or tic-douloureux occasioned in this manner. Burton

quotes from Dr. Cotta's 'Discovery of Ignorant Practitioners of Physick' two examples of what "Phansie is able to do; the one of a parson's wife in Northamptonshire, anno 1607, that coming to a physician, and told by him that she was troubled with the *sciatica*, as he conjectured (a disease she was free from), the same night after her return, upon his words, fell into a grievous fit of a *sciatica;* and such another example he hath of another good wife, that was so troubled with the *cramp;* after the same manner she came by it, because her physician did but name it" (xlviii, p. 169).

When visiting the Crystal Palace some years ago it struck the writer that the man who then had charge of a galvanic battery could tell something about Imagination. I was not mistaken, for he assured me that very often when a lady had grasped the handles of the machine she remarked on the peculiar sensations she experienced, and quite thought she was being galvanised, although he had not put the battery in action. But it is, in fact, perhaps equally deserving of notice, that such subjective impressions may, as in the present instance, have a limit to their operations, for the galvanist stated that he had never observed any twitching of the hands from these imaginary shocks.

Lauzanus records the case of a young man who watched with great attention a priest being bled from the arm for an attack of pleurisy. Two hours afterwards he experienced a severe pain in his own arm, and at the spot corresponding to that of the puncture, and did not get rid of it for a couple of days (lx, p. 154). This is a fair instance of the primarily neuralgic class of cases, caused by a stimulus acting centrally upon the sensory nerves. In this and the following case it is impossible to say whether emotional excitement assisted the result.

Gratiolet (xv) relates that a law student who was present for the first time in his life at a surgical operation which consisted in removing a small tumour from the ear, felt at the same instant so acute a pain in his own ear that he involuntarily put his hand to it and cried out. Gratiolet, who himself witnessed the circumstance, does not state whether the affected ear corresponded to that upon which the operation was performed, but this is implied. The case forms an excellent illustration of

simple pain caused by what is popularly understood as "sympathy," a fellow-feeling, which almost brings it under the category of emotional influence.

Anæsthesia.—Insensibility to bodily pain, artificially induced, without drugs and solely by psychical means, is a most interesting and important fact, and would require a chapter instead of a few paragraphs to do it justice. No one who has studied the history of anæsthetics* in all forms, doubts that, whether by inducing a profound and peculiar kind of sleep, or by merely rendering the patient insensible to sensorial impressions related to a certain idea or train of ideas, severe as well as trivial operations may be performed without any pain. A few words on anæsthesia, especially in connection with Dr. Elliotson and Mesmerism, may not be out of place here.† A passage written by Dr. Forbes in the 'British and Foreign Medical Review,' on its employment in surgical operations, is now of real historical interest, and the period which it marks ought not to be overlooked by any one who undertakes to write a complete history of anæsthetics. Four years before (in 1842) at a discussion at the Medical and Chirurgical Society, on an operation performed without pain under the influence of Mesmerism (so-called), a distinguished member of the profession, the late Dr. Copland, asserted that the fact was unworthy of the Society's consideration, because pain is a wise provision of nature, and patients are all the better for it, and recover more quickly ! sarcastic Dr. C. did not such it?

In 1843 appeared Dr. Elliotson's well-known work, 'Numerous Cases of Surgical Operations without Pain in the Mesmeric State.' Then after the lapse of a few years, a large number of capital operations in various countries (especially in India by Dr. Esdaile) having been painlessly performed, a considerable change of opinion evidently took place, and Dr. Forbes, in his

* It is a remarkable fact that in all, or nearly all histories of anæsthetics, *psychical* anæsthetics are not even mentioned. Yet they preceded drug-anæsthesia, and to a large extent suggested it. Cloquet removed a woman's breast, during the mesmeric sleep (she being able to converse, but insensible to pain), so far back as 1829. It is said that no fatal case from psychical anæsthesia has occurred.

† *Vide* Remarks by the writer on the occasion of Dr. Elliotson's death, in the Medical Times and Gazette,' August 29, 1868.

'Review' for October, 1846, thus writes:—"Indeed, we hesitate not to assert that the testimony is now of so varied and extensive a kind, so strong, and, in a certain proportion of cases, so seemingly unexceptionable, as to authorise us—nay, in honesty to compel us—to recommend that an immediate and complete trial of the practice be made in surgical cases." But scarcely had this number of the 'Review' appeared when the first operation under the influence of ether was performed in America! This was on October 16th, and the news reaching England on December 17th, its discovery was announced in the 'Medical Gazette' of the 18th, under the head of "Animal Magnetism Superseded," and on the following day Liston operated for the first time upon a patient under its influence. It was soon seen that many phenomena, such as partial consciousness, calling out as if in pain, sensitiveness to slight touch, were quite consistent with perfect anæsthesia, and were not, as many had supposed when they occurred in mesmeric patients, proofs of imposture. Now, Dr. Elliotson and his opponents were both right and wrong—he wrong in asserting that Mesmerism would be the anæsthetic ultimately adopted by the profession, but right in his belief that operations had been painlessly performed under its influence; however its mode of action be explained. We can but smile now at the objection already referred to, raised with so much flippancy against the prevention of pain; possibly we ought rather to blush that members of our profession should, on this ground, have opposed the noble attempt to introduce painless operation in surgery. Perhaps the prejudice was not more singular than that of the esteemed Editor of 'Chelius' against the employment of ether, for he wrote, in 1847, "I have considerable doubt of the propriety of putting a patient into so unnatural a condition as results from inhaling ether, which seems scarcely different from severe intoxication, a state in which no surgeon would be desirous of having a patient who was about to be submitted to a serious operation" (lxii, II, p. 1009).*

* Since writing the above, I observe the following in one of the public journals. I cannot vouch for its truth. "Dr. Gull, in 1847, questioned the desirability of removing pain. Bransby Cooper was 'averse to the prevention of suffering,' which, as he thought, led to 'reparatory action.' 'Pain,' argued Mr. Nunn, in

In regard to the *special senses*, the influence of the mind is notorious. If any one prefers to consider the senses under the term Mind (as we ought, strictly speaking, to do) he has but to suppose that we are illustrating the influence of one group of mental faculties over another group, instead of that of Mind over Body. All we maintain is that the state of the mind—the condition of the cerebral hemispheres—may play upon the ganglia of the senses so as to produce certain sensorial phenomena, and also that it may so affect the sensorium that impressions upon the senses received from the outer world may be modified in various ways. We cannot adopt Hunter's expression "the idea of a sensation is supposed to be the sensation itself," for there is a sensation, although subjective. When there is actual hallucination, we may say the idea of a sensation having induced such intensity of action of the sense-ganglia, as to cause the same effect as if excited by a material object, is supposed to be a sensation caused by an objective impression.

There is a striking observation made by St. Theresa, whom M. Maury characterises as the metaphysician of feminine mysticism and of ecstatic illumination; namely, "I have known some of weak mind who imagine they *see* all that they *think*, and this," she adds, "is a very dangerous condition." One practical reflection may, in passing, be made upon the ecstatics to whom she refers. It would be much more difficult to believe in the credulity of the saints and mystics, if we did not see ample physiological reasons for believing that the senses were really acted upon by their intense thought on certain spiritual subjects. They knew nothing of the action of Expectation or Imagination upon the sensorium. We know to what source Luther referred his visions, even when they were such as we might have supposed he would welcome. In the following instance, one cannot attribute the influence of the

one of the London medical organs, 'is compensated for by the effects produced on the system;' and a Dr. Pickford wrote that 'pain during operations was beneficial;' while Magendie—he who said to the writhing dog, 'Taisez-vous, mon petit!'—declared in the French Academy that 'it was trivial to suffer, and that an invention to annul pain under the knife was only of mediocre interest to surgery.' From this point of view, freedom from pain in a future world would be rather a disadvantage than otherwise.

brain to either of the above-mentioned states of mind, and it is, therefore, a specially interesting example of automatic cerebral action, excited by an idea vividly present in the mind. "On Good Friday last," he says, "I being in my chamber in fervent prayer, contemplating with myself how Christ, my Saviour, on the cross suffered and died for our sins, there suddenly appeared upon the wall a bright vision of our Saviour Christ with the five wounds, steadfastly looking upon me, as if it had been Christ himself corporeally. At first sight, I thought it had been some celestial revelation, but I reflected that it must needs be an illusion and juggling of the devil, for Christ appeared to us in His word, and in a meaner and more humble form; therefore I spake to the vision thus :—Avoid thee! I know no other Christ than He who was crucified, and who in His word is pictured and presented unto me. Whereupon the image vanished, clearly showing of whom it came" ('Table Talk,' p. 104).

Now in such a case as this, while we do not think it necessary to assume more than an excitement of the sensory ganglia, Müller would have held that there was an image impressed on the retina excited by internal instead of, as normally happens, by external stimuli.* In his section on the "Influence of the Mind upon the Senses," he objects to the term hallucination being applied to such experiences, because it implies that the phantasm is a mere idea, instead of being truly a sensation. This objection is, of course, equally forcible whether we regard the retina (in the case of vision) or the central ganglia, as the seat of the phenomenon.

Müller's remark, when referring to those cases in which extirpation of the eye co-exists with phantasms, that they "prove that the presence of the retina is not a necessary condition for the production of such phenomena, but, on the

* Müller says, "The process by which phantasms are produced is the reverse of that to which the vision of actual external objects is due. In the latter case particles of the retina thrown into an active state by external impressions, are conceived in that condition by the sensorium; in the former case, the idea in the sensorium excites the active state of corresponding particles of the retina or optic nerve" (iii, p. 1391). He adds that the action of an idea upon the organ of vision, so as to produce a corresponding sensation (spectre) is not more remarkable than the ordinary function of sight by which an idea of an object is produced.

contrary, that the deeper seated parts of the essential organ of vision are alone required" is an admission sufficient to allow of all other instances of spectral phenomena from subjective causes* being referred to the sensory ganglia and central nuclei of the optic nerve. Luther's mode of accounting for the vanishing of the apparition is an amusing contrast to the description given by Müller of phantasmata witnessed by himself on waking. "I have myself," he says, "very frequently seen these phantasms, but am now less liable to them than formerly. It has become my custom, when I perceive such images, immediately to open my eyes and direct them upon the wall or surrounding bodies. The images are then visible, *but quickly fade.*" So prosaic a narrative of events would have hardly suited the fervent imagination of the great Reformer.

Unusually vivid sensations from external objects occasioned by cerebral excitement at the time will, as we have frequent proofs, remain, or be easily recalled, long after the original impression was received. This was strikingly shown in the experience of one of the survivors of the unfortunate "London." When escaping from the wreck, in the boat, he would sometimes be baling out the water and half asleep at the same time. When in this state he could always see a vessel before him with her stern under water, her jibboom and foretopmast gone, and her foresail shaking in the wind. "It was the 'London' as she last appeared to me. At any time during the night if I were to close my eyes, if only for a second, the ship was always before me *in this form.*" And after being picked up by the barque next day, and able to have some sleep, he says, "and a troubled sleep it was. I passed through all the horrors of another shipwreck; and for many nights after, and I may say many weeks after, I had to go through the same ordeal." The phenomena are of a mixed character in these cases. The mental condition, no doubt, originally determined the intensity of the sensations which led to the subsequent spectral ship; but in his sleep, the writer's sensory ganglia excited the activity

* It is hardly necessary to say we do not now refer to cases of spectral phenomena (whether hallucinations or illusions) which do originate in disease of the retina.

of the cerebral hemispheres; sensation excited a corresponding train of ideas.

The simplest example, perhaps, which can be adduced of the influence of Attention upon the sensory ganglia, is the act of recalling a visual impression, even after a long interval of time. Thus, Sir Isaac Newton, in a letter to Locke (xxxi, I, p. 40), describes how he once looked a short time at the sun in a mirror, and then turned his eyes into a dark corner of his room till the spectrum vanished, repeating the experiment three times. The third time he found to his amazement, when the light and colours were almost gone, that they began to return "by intending his fancy upon them," and became as vivid as when he had just looked at the sun, but if he ceased to intend his fancy upon them, they vanished again." "After this," he says, "I found that as often as I went into the dark and intended my mind upon them, as when a man looks earnestly to see anything which is difficult to be seen, I could make the phantasm return without looking any more upon the sun, and the oftener I made it return, the more easily I could make it return again." At last he brought his eyes "to such a pass" that he had to shut himself up in a dark room for three days together "to divert my Imagination from the sun; for if I thought upon him, I presently saw his picture, though I was in the dark." By this method, and employing his mind about other things, he began in a few days to have some use of his eyes again. Yet for some months after, "the spectrum of the sun began to return as often as I began to meditate upon the phenomena, even though I lay in bed at midnight, with my curtains drawn." When Newton wrote this interesting account to Locke, he said he had been several years very well, but he thought that he could recall the spectrum "by the power of his Fancy," if he durst try. He adds, that such an occurrence involves a question "about the power of Fancy," which he confesses is "too hard a knot for me to untie," but inclines to refer it to "a disposition of the sensorium to move the Imagination strongly, and to be easily moved, both by the Imagination and by the light, as often as bright objects were looked upon." Another remarkable observation was made by Newton in this case. He had only looked at the sun (in the mirror)

with his right eye, yet he found that "my Fancy began to make an impression on my left eye as well as upon my right," and he could see the spectrum of the sun if he did but intend his Fancy a little while upon it. So that here the powerful direction of Thought or Attention produced the same effect on the left eye, or a point in the optic ganglia corresponding thereto, as that of the sun itself upon the right eye.

The following, related by Sir B. Brodie, is a case in point:—

"A gentleman of my acquaintance, of a very sensitive and imaginative turn of mind, informed me that not unfrequently when he had his thoughts intensely fixed for a considerable time on an absent or imaginary object, he had at last seen it projected on the opposite wall, though only for a brief space of time, with all the brightness and distinctness of reality" (xxx, p. 84).

A man has his mind so far awake during sleep as to dream of a figure; either one which has formerly impressed his retina and sensorium, or which he never saw, and is the product of his Imagination. That his sensory ganglia at least have been in activity, as well as his cerebral lobes, is indicated by the occasional persistence of the phantom after awaking from the sleep in which the dream has occurred. Müller referred to this fact to prove that the retina is acted upon by the activity of the brain or mind in sleep, but we need not go further than the sensorium. The idea has been transmitted there—an ideo-sensory action.

The next case given by Brodie illustrates these remarks. He gives it as a proof that in visions connected with our dreams, there is something more than what occurs in the instance of objects ordinarily presented to our minds by Memory and Imagination. What this "more" consists of is not decided by Brodie, and its decision must depend upon whether we hold that in the operation of these faculties the same brain-tracks (sensory ganglia) are excited as in the production of actual phantoms, the only difference being one of intensity; or, that the cerebral hemispheres only are in operation. "A friend of mine, on awaking in the morning, saw standing at the foot of his bed a figure in a sort of Persian dress. It was as plainly to be seen, and as distinct, as the chairs and tables in the room, so that my

friend was on the point of going up to it, that he might ascertain what, or rather who, it was. Looking, however, steadfastly at it, he observed that, although the figure was as plain as possible, the door behind it was plainly to be seen also, and presently the figure disappeared. Considering the matter afterwards, he recollected that he had had a dream, in which the Persian figure played a conspicuous part; and thus the whole was satisfactorily explained, it being evident that the dream, as far as this part of it was concerned, had continued after he was awake, and so that the perception of the imaginary object had existed simultaneously with that of the real ones."

The readers of Scott's 'Demonology and Witchcraft' will remember a remarkable example of spectral illusion, cited by him from Peter Walker's 'Lives,' occurring on the banks of the Clyde in 1686. In this instance a great many persons saw, while others failed to see, companies of men in arms marching along and disappearing; also bonnets, guns, and swords. The narrator says that a gentleman near him called out "All you that do not see, say nothing; *for I persuade you, it is a matter of fact, and discernible to all that are not stone blind!*" and he proceeds, "Those who did not see told what locks the guns had, and their length and wideness, and what handles the swords had, whether small or three barred or Highland guards; and the closing knots of the bonnets, black or blue; and those who did see them there, *whenever they went abroad, saw a bonnet and a sword drop in the way.*" He estimates the proportion who could see these objects at two thirds. Nicolai's experience (without any suggestion from without) forms an excellent parallel. "I saw several times people on horseback, dogs, and birds. All these phantasms appeared to me in their natural size, and as distinct as if alive, exhibiting different shades of carnation in the uncovered parts, as well as in different colours and fashions in their dresses, though the colours seemed somewhat paler than in real nature. None of the figures appeared particularly terrible, comical, or disgusting, most of them being of an indifferent shape, and some having a pleasing appearance" (xxvii, vol. vi).

Anæsthesia of the special senses in regard to all impressions from without, except those with which a person from some par-

cular cause is in relation, is strikingly exhibited in "biolo-
cal" or hypnotic states. Thus a subject may be deaf to all
unds except the voice of the operator. Sir James Simpson
inted out this fact, years ago, at a meeting of the Edinburgh
Iedico-Chirurgical Society. He observed that such persons
were deaf for the time to other sounds. Bells may be rung
their ears, strong noises of all kinds made, tickling, shaking,
ubbing the cornea, &c., practised, but they sleep on, apparently
stening alone to the voice that sent them asleep to summon them
gain to the wakening state" (xxiv, and vii, Oct. 1851).

It may be that in such cases it can hardly be said that the
erebral hemispheres act upon the sensory ganglia so as to
roduce this effect, and that it is rather that the impressions
hich reach the sensorium are not perceived by the mind,
nless they be directly related to the idea or ideas which are
t that time dominant. Still, the state of the Intellect deter-
ines the effect of the sensorial impression. This condition is
xemplified also in cases of ordinary sleep, absence of mind or
bstraction, day dreaming or reverie, as well as in the somnam-
ulistic states just referred to. Dr. Carpenter states that "Sir
dward Codrington, when a young man, was serving as signal-
eutenant under Lord Hood at the time when the French fleet
as confined in Toulon harbour, and being desirous of obtaining
ne favorable notice of his commander, he devoted himself to
is duty—that of watching for signals made by the look-out
igates — with the greatest energy and perseverance, often
emaining on deck nineteen hours out of the twenty-four, with
is attention constantly directed towards this one object.
uring the few hours which he spent in repose, his sleep was so
rofound that no noise of an ordinary kind, however loud,
ould awake him, and it used to be a favorite amusement with
is comrades to try various experiments devised to test the
oundness of his sleep. But if the word "signal" was even
hispered in his ear, he was instantly aroused and fit for imme-
iate duty" (viii, p. 855).

In this case, both the cerebral hemispheres and the sensory
anglia must have been in a state of profound repose, but there
xisted an impressibility as regards that particular idea, and
his idea aroused the influence which, according to Mr. Moore,

controls the sympathetic ganglia, and through which the vessels of the brain fill again. Dr. Carpenter expresses it thus: "The awakening power of sensory impressions is greatly modified by our habitual state of mind in regard to them. Thus, if we are accustomed to attend to these impressions, and our perception of them is thus increased in acuteness, we are much more easily aroused by them than we are by others which are in themselves much stronger, but which we have been accustomed to disregard."

A curious illustration of the influence of the Imagination in modifying the perceptions of sensorial impressions derived from the outer world, occurred during the conflagration at the Crystal Palace in the winter of 1866-7. When the animals were destroyed by the fire, it was supposed that the chimpanzee had succeeded in escaping from his cage. Attracted to the roof, with this expectation in full force, men saw the unhappy animal holding on to it, and writhing in agony to get astride one of the iron ribs. It need not be said that its struggles were watched by those below with breathless suspense, and, as the newspapers informed us, "with sickening dread." But there was no animal whatever there, and all this feeling was thrown away upon a tattered piece of blind so torn as to resemble, to the eye of fancy, the body, arms, and legs, of an ape!

In the following case within my own knowledge the visual illusion was clearly excited by the idea being, in the first instance, present to the mind. A lady was walking one day from Penryn to Falmouth, and her mind being at that time, or recently, occupied by the subject of drinking fountains, thought she saw in the road a newly erected fountain, and even distinguished an inscription upon it, namely—

"If any man thirst, let him come unto me and drink."

Some time afterwards she mentioned the fact with pleasure to the daughters of a gentleman who was supposed to have erected it. They expressed their surprise at her statement, and assured her she must be quite mistaken. Perplexed with the contradiction between the testimony of her senses and of those who would have been aware of the fact had it been true, and feeling that she could not have been deceived (for "seeing is

elieving"), she repaired to the spot and found to her astonish-
ent that no drinking fountain was in existence—only a few
attered stones, which had formed the foundation upon which
e suggestion of an expectant Imagination had built the super-
ructure. The subject having previously occupied her atten-
on, these sufficed to form, not only a definite erection, but one
scribed by an appropriate motto corresponding to the leading
ea.

Dr. Wigan's well-known experience in his own person is a case
point, and is too striking to be omitted from our *collectanea*
sychica. He was attending a *soirée* given in Paris by M.
ellart, shortly after an event which strongly excited public
eling—the execution of Marshal Ney—when the incident
curred. On the arrival of a visitor, M. Maréchal *ainé*, the
sher announced Maréchal Ney. Dr. Wigan says, an electric
udder ran through the company, and he owns that the
semblance of the prince was, for a moment, as perfect to his
es, *as if it had been the reality*.

The somewhat similar illusion of which Scott was the sub-
ct when reading with much interest an account of Byron's
abits and opinions, not long after his death, need not be
tailed, but it will be remembered that passing from his sitting
om into the entrance hall, fitted up with the skins of wild
asts, armour, &c., "he saw right before him, and in a
anding posture, the exact representation of his departed friend,
hose recollection had been so strongly brought to his Imagi-
tion. He stopped, for a single moment, so as to notice the
nderful accuracy with which Fancy had impressed upon the
dily eye the peculiarities of dress and posture of the illus-
ious poet. Sensible, however, of the delusion, he felt no
ntiment save that of wonder at the extraordinary accuracy of
e resemblance, and stepped onwards towards the figure,
hich resolved itself, as he approached, into the various mate-
ls of which it was composed. These were merely a screen
cupied by great coats, shawls, plaids, and such other articles
usually are found in a country entrance hall." Sir Walter
turned to the spot from which he had seen this product of
hat may be called Imagination *proper*, and tried with all his
ight to recall it by the force of his Will, but in vain—a good

illustration of the slight influence of volition over sensation compared with that of a vivid mental image or idea acting upon the sensorial centres, and distorting or moulding in other forms the impressions received from objects of sense. The fault does not lie in the afferent nerve, but in the central organs; not in the telegraph wire, but in the somewhat muddled official sitting at the company's head office and endeavouring to decipher the messages. In truth, in our ordinary language, we give the senses a worse character than they deserve. They report correctly on various occasions, but we draw an incorrect inference or read their reports in a hasty or slovenly manner. It is only when the sensory apparatus is diseased in the first instance that we can properly speak of the senses deceiving us. The common reply to this apology for our senses is that in many instances, as in that of the oar which, although entire, looks broken in the water, our senses even in a healthy condition mislead us. A little consideration, however, will show that our senses are not really at fault even in this instance, and that if we arrive at a false conclusion, it is the result of our not making allowance for an intervening medium between the eye and the oar. Who would blame the eye because it could not have seen the oar at all, had there been a stone wall in the way? As unfair would it be to charge the eye with deception because its function is interfered with and distorted by an intervenient fluid. The child believes the oar broken because he has not yet learned the effect produced by the refracting power of water. Ignorance is the cause of an erroneous belief; the water the cause of the appearance of the oar; the organ of sight must be acquitted of all blame. Reid says he once met with a man who urged that the Protestant argument against transubstantiation from the testimony of our senses was inconclusive, because, as there are cases in which several of our senses deceive us, how do we know that they may not all deceive us in this instance? The discussion which followed need not occupy our attention; one on the same subject between Erasmus and Sir T. More is so much to the purpose, as the influence of Imagination united with Belief is especially brought out, that it may be referred to, although the effect is rather a mental than a bodily one. The latter, when visited by

Erasmus, endeavoured to convert him to a belief in the Real Presence, and assured him that if he would only believe he would be satisfied of its truth by unquestionable evidence. On leaving More's house he borrowed his pony, and finding it very useful did not incline to return it, but sent the following lines:

"Quod mihi dixisti
De corpore Christi,
Crede quod edis, et edis:
Sic tibi rescribo,
De tuo palfrido,
Crede quod habes, et habes;"

which a writer in 'Macmillan' for September, 1865, translates thus:

"Remember, you told me
Believe and you'll see;
Believe 'tis a body
And a body 'twill be.

"So should you tire walking
This hot summer-tide,
Believe your staff's Dobbin,
And straightway you'll ride."

As regards the sense of hearing, it is very manifest that the thought uppermost in the mind—the predominant idea or expectation—makes a real sensation from without assume a different character. If of two children listening to a peal of bells one is told that they say "Long live the King," and the other, "Never, for ever," to each the chime may sound as he expects to hear it. But, of course, those instances are much more striking in which the expectation excites the central termination of the auditory nerve, so that sounds, voices, &c., are actually heard. The Imagination may be justly said to be the cause, but it is no imagination that sounds are heard. The fine passage of Madame de Stael, "So mighty sometimes is the power of Imagination, that by it we hear in our hearts the very voice and accents of one whom we love," is true in a more literal sense than probably she intended.

The influence of Attention in intensifying auditory sensations is constantly brought under our notice. The Highland woman hearing the distant pibroch when Havelock was approaching to

the relief of Lucknow is a beautiful illustration of the familiar fact that the intense direction of the thoughts to a particular sensation increases the sensitiveness of the sensorium.

So with the sense of taste. "Hold your tongues!" exclaimed a Frenchman, "I cannot taste my dinner." The conversation distracted his Attention, and would not allow him to dwell upon his viands with the gusto which a gourmand desires. With imaginative people, the food eaten or the fluid drunk assumes a very different taste according to the fancy. Misled by Expectation, the grumbler finds the meat taste bad, the water is abominable. I have known a gentleman, hopelessly fanciful, send out the cream from table because it tasted sour, and find it sweet when the servant brought in what was supposed to be, but was not, a fresh supply.

The influence of the Imagination (in its expective form) upon the olfactory sense is well exhibited in a case reported by Professor Bennett, of Edinburgh (xviii, p. 15):

"A clergyman told me that some time ago suspicions were entertained in his parish of a woman who was supposed to have poisoned her newly born infant. The coffin was exhumed, and the procurator-fiscal, who attended with the medical men to examine the body, declared that he already perceived the odour of decomposition, which made him feel faint, and in consequence he withdrew. But on opening the coffin it was found to be empty, and it was afterwards ascertained that no child had been born, and consequently no murder committed."

The sense of *weight* has frequently been misled by the Imagination. The anecdote of Dr. Pearson, though well known, is so good an illustration that it can hardly be omitted in this place. When potassium was discovered by Davy, Dr. Pearson, taking up a globule, estimated its weight on his finger, and exclaimed "Bless me, how heavy it is!" simply from expecting a metal to be so, whereas the reverse was the real truth.

In his 'Human Physiology' (4th edit., p. 821), Dr. Carpenter states that he "has seen a man remarkable for the poverty of of his muscular development, who shrank from the least exertion in his ordinary state, lift a twenty-eight-pound weight upon his little finger alone, and swing it round his head with the

greatest facility." Now, this was due, first, to a mental condition rendered acutely susceptible to impressions, and then to the action of the Imagination, when the subject was assured that the weight was a mere trifle, and that he could lift it easily. This idea by affecting the muscular sense of resistance, produced the same effect as actually lessening the weight would have done. Again, to the same individual, when in the same impressible state, a handkerchief placed on the table felt so heavy that he could not raise it after repeated attempts to do so.

In regard to other muscular sensations, they receive further illustration from the influence of the Attention on involuntary movements, in the chapters on muscular action.

We do not propose to enter into the influence of the Intellect upon the sensations of Organic Life, beyond the general observation that attention to the various processes of secretion and nutrition not only excites their activity, as will be subsequently shown, but is accompanied by more or less well-defined feeling. The ordinarily obscure sensations which these processes occasion become intensified, and a long train of hypochondriacal symptoms follows. Under this head are comprised the sensations of the alimentary canal, including the pharynx, œsophagus, stomach, and intestines. The familiar sensation at the pit of the stomach, the consequence of perturbations of mind, belongs to the Emotional section of mental states, under which also the disagreeable sensations of hypochondriasis will be referred to, although admitting of explanation by a reference to the mere operation of the Attention.

In concluding this Section, I wish to revert to the states of mind in Recollection and Imagination in connection with the vexed question of the character and seat of resuscitated mental images.

It is disputed, as regards the ordinary memory of an object or the creations of the Imagination—re-presentative consciousness—whether the same psychical or encephalic condition is excited as in the actual perception of an object present to the senses—presentative states of the Mind. It is obvious that the answer to this question is of great interest in the consideration of the influence of ideal psychical states upon the body, whether

intellectual or emotional. The teachings of psychologists of the present day appear decidedly to favour an affirmative reply.

Abercrombie's work on the 'Intellectual Powers' elicited a remarkable review in the 'Quarterly' for July, 1831, from the pen of Sir David Brewster, who combated the idea that in Memory and Imagination the mind recalls past impressions and forms fresh combinations, "without any assistance from the organs of perception," and maintained that while in the ordinary action of these faculties, owing to the exceedingly fleeting character of the mental images produced, and the counteracting influence of the external world, we cannot fix and subject them to examination, there are exceptionally favouring circumstances which render it possible to examine them as carefully as impressions made upon the retina by luminous bodies, and that in these cases the images recalled by Memory, or created by Imagination, "follow the motions of the head and eye." This he explained by supposing that the recollection of an object previously seen, acts by retransmission from the brain along the nerves to the same points of the retina as had been acted upon by the original object, when the impression there had been transmitted to the sensorium. A very faint and transient impression was supposed by him to be formed on the retina, just sufficient for the purposes of Memory and Imagination. If, moreover, these faculties are powerful, and the nerves excitable, the retinal impression becomes so distinct as to constitute a spectral illusion. Brewster's general conclusion was this, that "in all our organs of sense the mind possesses the power of retransmitting through the nervous filaments to the expansion of the nerves which are acted upon by external objects, impressions which these nerves have previously transmitted to the brain," feeble in ordinary Memory and Imagination, brilliant and phantasmatic in abnormal states of the brain or nerves. If for the peripheral expansion of the sensory nerves we substitute the sensorium, or whatever that portion of the brain may be in which impressions are registered, Brewster's opinion is in accordance with that to which we have just referred. His proofs are not altogether satisfactory, for, in the first place, the examples he adduces are not those of ordinary Memory or Imagination; and, secondly, as regards actual phantasms, the

fact that they move with the eye may be explained on another principle than that of referring the revived impression to the external organs themselves.

At first sight, simply to think of and recall the face of an absent friend, and so to think of him as to see his face projected as if present before me, do certainly seem very distinct psychical, and therefore encephalic, conditions, not only in degree or intensity, but in kind and seat. The one operation feels to be so purely "mental," the other so sensorial. That subjective sensations and objective sensations occupy the same seat cannot be doubted; but the difficult question is, whether the definite remembrance of a particular object passing beyond a mere notion does or does not cause a true sensation, however faint. It is easy to believe that the seat of a spectral form of a mountain is identical with that of the conscious impression of the actual object when present to the senses, but not so easy to believe that in recollecting a certain mountain, and tracing its outline, or imagining one, "we are repeating the same currents and reanimating the same nervous tracks as in the survey of the actual mountain" (Bain). In opposition to this hypothesis it is urged* that perception is a bi-une fact, or a synthesis of cognition and object, while Memory and Imagination are not so, for the object is not present to them. It is denied that seeing a rose and the remembered outline of a rose involve the same operation of mind — the only difference being, as alleged, one of intensity. Dr. Carpenter, on the other hand, speaks of "ideas or conceptions as cerebral (*i. e.* hemispherical) states, which seem to recall the same condition of the sensorium, as that which was originally excited by the sensory impression" (viii, p. 749). It is true, I can think of a rose, have a bare abstract notion of it, without any action of the sensorium, but it may nevertheless be true that the moment it is figured in the mind's eye, although no spectrum or phantasm is formed, there occurs a change in the optic nerve-centre—the corpora quadrigemina. Still, we think, it is prac-

* See this position ably maintained by Rev. W. G. Davies in the 'Journal of Mental Science' for April, 1864. See also the observations of Mr. L. Clarke in the 'Psychological Journal,' January, 1863, p. 19.

tically difficult to decide at what point the strictly ideational passes into the sensational.

Let us, on account of the importance of the subject, consider a little further the changes which physiologists assume take place in recalling a sensation, such as seeing a person's countenance in the mind's eye. According to Carpenter, it is, as we have seen, a secondary change, caused by the influence of ideational (hemispheric) activity upon the sensory ganglia. I recall the notion of this object—the face—by which the sensory impression or state was formerly produced, and by keeping such notion before the consciousness I am enabled to see in my mind my friend's face. The general notion is all that some can attain to, the sensational state not being reproduced. He remarks that we can remember the *expression* of a countenance better than the *features*, because the former appeals most to our ideational consciousness, while the latter obliges us to recall a sensational state. As in Recollection, so probably is it in spontaneous or passive Memory; though here external objects may help to excite the renewal of previous sensations. His special theory, which ought to be kept distinct from the general question, is that the sensory ganglia, in all probability, do not register sensory impressions; "these can only be reproduced afresh by the action of external objects, or ideational changes." The hemispheric ganglia, in reproducing ideas, act independently of the sensorium, except that, according to this physiologist, the results of such cerebral action "must be impressed on the sensorium before we can be rendered conscious of them." Probably every sensory impression, once perceived, is registered in the cerebral hemispheres, and "may be reproduced at some subsequent time, although there may be no consciousness of its existence in the mind, during the whole intermediate period" (p. 808).

It is not necessary to adopt, in an unqualified manner, the details of this somewhat elaborate theory, founded to a large extent upon the hypothesis that the hemispheres themselves are not the seat of consciousness. The essential point remains, and is as applicable to the present subject, if the hemispheres be admitted to be conscious ganglia without the co-operation of the ganglia beneath them. We have seen that Bain (who

upholds the latter view) is equally strong in maintaining that the ideas which our Memory and Imagination form of external objects, involve the action of the same tracts in the encephalon as are excited by impressions immediately derived from the material world, or from those internal subjective stimuli which cause actual hallucinations.

Again, Herbert Spencer, the teacher, κατ' ἐξοχήν, among psychologists, of the doctrine of Evolution, arrives by this and other routes of profound psychical investigation at the same conclusion. Thus, he says, when speaking of the ideas of throwing a stone, or seeing a dog run away, "these, that we call ideas, are nothing else than weak repetitions of the psychical states caused by actual impressions and motions" (x, p. 456). An expression he employs is a very forcible one—the nascent excitation of nerves in the revivability of former impressions. In the above-mentioned acts this occurs, as respects the motor apparatus, in thinking of throwing a stone; and as respects the optic nerves, in the mental picture of a dog running away. "Those vivid states of consciousness which we know as sensations, accompany direct, and therefore strong, excitations of nerve-centres; while the faint states of consciousness which we know as remembered sensations, or ideas of sensations, accompany indirect, and therefore weak, excitation of the same nerve-centres" (p. 124).

Mr. G. H. Lewes in an article in the 'Fortnightly Review' (February, 1872) on "Charles Dickens," states an interesting fact in reference to his brain-fictions, namely (what the novelist had himself told him), that "every word said by his characters was distinctly *heard* by him. I was at first," he adds, "not a little puzzled to account for the fact that he could hear language so utterly unlike the language of real feeling, and not be aware of its preposterousness; but the surprise vanished when I thought of the phenomena of hallucination." Such instances may be thought to support the opinion that the creations of the Imagination, and the images recalled by the memory occupy the same nervous tract as those which are excited by impressions from without, and that they only require additional intensity to become what are admitted by all to be (subjective) sensations possessing the distinctness which ordinarily charac-

terises those of objective origin. At any rate, they show how great a tendency mere thought has to excite or awaken the correlated sensation. Dickens also says, in regard to his sister-in-law Mary, that after her death he was haunted by her image every day, and dreamt that he saw her every night for a year. He does not mean, we suppose, that he saw a spectral form in the day—merely a vividly defined and irrepressible memory of her person. In the dream, when the outer world was excluded, the very same image presented all the characters of a sensorial impression.

Just, then, as in perceiving objects around us, subject-consciousness and object-consciousness are united, sensorial perception passing insensibly into intellectual perception; so in Recollection and Imagination, the ideational and sensational changes are almost inseparable; the calling up of the one state as originally excited by external objects, calls up the other; and in this way the old paths are traversed, though in a reverse order. It may, however, be admitted, we think, that the original idea which was abstracted from the sensorial perception can arise in the mind, or be recalled as a general notion, without the action of the sensory centres being excited.

The application of this position to the influence of ideal states of mind is obvious; whether they excite by their intensity and vividness general bodily sensations, or such action of the sensorial centres that the Mind refers the special sensations to objective sources of excitement; whether they cause movements, or whether they act upon the organic functions. Whatever hypothesis we adopt, the fundamental fact remains that Sensation and Motion are not merely more readily reproduced by the original impressions being repeated, but may be reproduced without our having the slightest recourse to the original, so that we may breathe an atmosphere in which the body feels, the eye sees, the ear hears, the nose smells, and the palate tastes, as acutely as if the material world excited these sensations, and may perform muscular actions without, and even against, the Will, and with or without consciousness, solely in respondence to ideas, whether recalled by the Memory or created by the Imagination. There may be here two distinct series of automatic phenomena—the involuntary representation of single

or combined presentations, and the involuntary results in Sense and Motion—ideo-sensory and ideo-motor; the common centre acted upon by objective impressions from without and by subjective impressions from within, being the Sensorium, and the resulting sensations and motions being in many instances as powerful from the latter (the inner) source as from the former, and in some more so.

The following are the most important conclusions in connection with the Influence of the Intellect on Sensation:—

1. When ideas arise from the sensorial perception of impressions upon the peripheral terminations of the various classes of nerves, they may react upon the sensory ganglia, and influence general, special, organic, and muscular sensations, causing sensational illusions.

2. When, through intellectual operations, ideas are imagined or recalled, these may be merely ideational states, but they ever tend to become identical in character, though not necessarily in degree, with the complex states formed when peripheral impressions from external objects, first excited them. The recurrence therefore of the ideational state co-operating with the sensory ganglia, usually recalls also, although but faintly, the sensation corresponding to the idea.

3. In some conditions of the encephalic centres, such a powerful excitement of the sensory ganglia occurs, that the effect is identical in sensory force—in objectivity—with that which results from an impression produced upon the peripheral termination of the nerves, causing hallucinations or phantasmata.

4. The mind under certain circumstances can, by Attention, recall the sensorial impression so distinctly as to produce, *e. g.* in the case of sight, the spectrum or image which was impressed on the retina and perceived by the sensorium.

5. Not only may hyperæsthesia of one or more of the senses be produced, but complete anæsthesia be caused by psychical means; encephalic vascularity and innervation being increased or lessened in the several sense-centres.

CHAPTER III.

INFLUENCE OF THE INTELLECT UPON THE VOLUNTARY MUSCLES.

The several mental states comprised under the Intellect may, by their action on the voluntary muscles, induce—

I. *Regular contraction and relaxation: Movements.*
II. *Irregular and excessive contraction: Spasms and Convulsions.*
III. *Loss of power: Paralysis.*

SECTION I.—Muscular Contraction and Relaxation: Movements.

The influence of an intense and exciting idea or thought in inducing well-marked movements, is admirably illustrated in the description of two characters—one real, the other, indeed, fictitious, but, sketched by the hand of a master, equally true to nature.

Sir Philip Francis is described by his biographer as "pacing rapidly forward *as if to pursue a thought.* He would then suddenly turn short round, draw himself up to his full height, and 'with a sweeping of the arm' evolve some epigrammatic sentence or well-rounded quotation. Even his own family, habituated as they were to these sudden interruptions of the measured tread, with which he loved to pace up and down the utmost length that a small suite of rooms would allow him, were sometimes startled by the vehemence of the outbreak, and strangers were absolutely electrified" (xiii, I, p. 454).

The other character, Felix Holt, is thus graphically described:—"His small, nervous body was jarred from head to foot

by the concussion of an argument to which he saw no answer. In fact, the only moments when he could be said to be really conscious of his body were when he trembled under the pressure of some agitating thought." To some extent, no doubt, in both these instances, the intellectual element was followed by emotional excitement, which intensified the character of the external commotion.

Observe the eye when thought is concentrated upon a subject of purely intellectual interest. It illustrates a law we shall speak of more fully when we have to treat of the Emotions—the parallelism between the outward signs of mental states and the action of the senses.* Why, as regards any practical good to be attained, should any change occur in the organ designed only to examine external objects? Yet, as if stepping out of its province, it frequently peeps and pries, and strains all its powers to gain an insight into what is hopelessly beyond its ken. Why, but because the movements excited by the objects of the outer world, acting upon the senses, take place not only then, but when the thoughts are occupied by ideas having no relation whatever to the external world. It may seem a contradiction to this statement that, in profound meditation, the eyelids are sometimes closed to exclude outside distractions—the impressions from without calculated to confuse those from within—but the exception is only apparent, for the eye, when thus veiled, continues to fix its gaze steadily upon imaginary objects, or in motion endeavours to track an idea through intricate mazes of thought. The appearance of the eyes in ecstasy is a striking example of the appropriate, but, so to speak, purposeless action of the muscles of the eyeball in ideal states of mind. Again, the axes of the eyes in an absent man walking through the street, are not fixed upon the objects which he meets, but are directed towards a point suggested by a subjective image. Hence confused vision, and the danger of running against anything in the road. The philosopher is described by Engel

* Figurative or metaphoric expressions derived from Sensation are introduced here, instead of in the chapter on Sensation, in order to illustrate the parallelism between the action of the muscles when excited by Sensation and by Emotion. Diderot pointed out the importance of this correspondence, but we are mainly indebted to Gratiolet for having worked out the idea in detail.

as walking, while pursuing some luminous train of thought, with his eye ardently fixed, the eyelids sometimes joyously opened, sometimes half-closed, engaged in imaginary contemplation. Figurative language corresponds to figurative gestures. We speak of "the mind's eye" and "mental insight." When we perceive the bearings of a question we say emphatically "we *see* it." "The *eyes* of your understanding being enlightened" is another familiar example, and we must add—

> "Who so gross
> As cannot see this palpable device?
> Yet who so bold but says he sees it not,
> When such ill-dealings must be *seen in thought*?"

The French say "Je goûte cela," a mode of speech characterised by Gratiolet as "eminemment heureuse et fine," and he ends a lecture by expressing a hope that his propositions have been "goûtées" by the intelligence of his hearers.

The behaviour of the gustatory muscles and the salivary glands is in strict accord with this, when engaged in an *intellectual repast*, "the feast of reason and the flow of soul." Such expressions are sufficiently significant of the fact that figurative movements accompany certain operations of the Intellect, namely, smacking the lips, swallowing, &c. The description of Captain Porter at the Marshalsea, in Dickens's reminiscences of his early life, is most characteristic of this principle. He read aloud a certain petition prepared to present to the king, praying for a bounty to the prisoners to drink his Majesty's health, on the occasion of his birthday, to all who would hear it when attaching their signatures. "Captain Porter, in a loud, sonorous voice, gave him every word of it. I remember *a certain luscious roll* he gave to such words as 'Majesty—gracious Majesty—your gracious Majesty's unfortunate subjects—your Majesty's well-known munificence,' *as if the words were something real in his mouth, and delicious to taste*" (Forster's 'Life,' vol. i).

"J'entends cela" means either I hear or understand that—a double signification, due to the same remarkable parallelism existing between the two series of facts; and although here the muscular correspondence is not, at once, so clear as in the case of sight, the expression of the facial muscles, when a subject

is not understood, strikingly resembles the painful distraction of deafness.

We will only add, by way of illustration of all the senses being figuratively used, the forcible language of Sir Philip Francis on receiving from Edmund Burke a proof-sheet of his reflections on the French Revolution—language worthy of "Junius:"—"The mischief you are going to do yourself is, to my apprehension, palpable. It is visible. It is audible. I snuff it in the wind. I taste it already. I feel it in every sense, and so will you hereafter" (xiii, II, p. 282). A really magnificent example of figurative expressions!

The influence of Expectation (or Expectant Attention) upon the facial muscles, is well exemplified in the appearance they assume when a gun is about to be fired. The person so affected does not expect that anything is going to happen to himself, but there is a certain involuntary nervous twitching the Will endeavours to repress, which anticipates the instinctive contraction of the muscles around the eye, actually occurring when a sudden explosion or shot suggests danger.

We see a different form of Expectation exhibited in the common experiment of discovering the time of day, by holding a coin or ring by a hair or silk thread suspended between the finger and thumb in a glass, against the sides of which it is expected to beat the time of day. As is well known, it often proves successful, the unconscious action of the digital muscles responding to the Idea or Expectation present in the mind of the person making the trial. I was not aware that this, with a slightly different object, had been an old experiment, until looking recently at Lord Bacon's works I found the following:—"It is good to consider upon what things Imagination hath most force; and the rule, as I conceive, is that it hath most force upon things that have the lightest and easiest motions. . . . . Whatsoever is of this kind should be thoroughly inquired into. . . . . There would be trial made of holding a ring by a thread in a glass, and telling him that holdeth it, before, that it shall strike so many times against the side of the glass and no more." He adds an experiment depending for its success on the same principle, that of "holding a key between two men's fingers, without a charm, telling those who hold it, that at such a name

it shall go off their fingers." Bacon concludes thus :—"How-soever, I have no opinion of these things, yet so much I conceive to be true : that strong Imagination hath more force upon things living, or that have been living, than things merely inanimate; and more force, likewise, upon light and subtile motions than vehement or ponderous" (xiv, 'Nat. Hist.,' 957).

From the time of Bacon to that of Chevreul no one, so far as we know, investigated the subject in a philosophical spirit. The latter, finding that a pendulum composed of a flexible wire and heavy weight, would oscillate when held by the hand over certain bodies (*e. g.* mercury), although the hand was fixed and motionless, placed a sheet of glass between the mercury and pendulum when in motion, and found its oscillations uniformly impeded and at last arrested. Feeling that he had not discovered in the quicksilver the real cause of the motion of the pendulum, he fixed the hand from which it was suspended, instead of merely the arm. The result was that the pendulum did not move at all, whether, or not, the glass intervened between it and the mercury. He justly concluded that an unconscious muscular movement explained the oscillations which had puzzled him, and had a vague remembrance of being in "un état tout particulier" (xv, p. 280) when his eyes followed them. He next took the precaution to have his eyes bandaged, and found that this also had the effect of preventing any action of the pendulum.

His careful investigations resulted, therefore, in the conviction that, although a pendulum suspended from the hand over certain bodies, moves, and performs oscillations which increase more and more in extent, this motion is diminished and at last arrested, if glass, or anything else, be interposed between the pendulum and the body over which it oscillates, with the *Expectation* that it will have this effect. Further, it is arrested the moment the hand itself is supported, or if the eyes of the experimenter are bandaged; the reason of the latter being that the guiding sense of Sight, so essential to motion when the Will is in abeyance (as exhibited in paralysis), has been taken away.

Nothing can more clearly illustrate than the above experiment, the influence of what is popularly called the Imagination, and which resolves itself in such cases into Expectation. It

forms an *experimentum crucis* which demonstrates the true principle at work in a large number of the cases given in this book; a principle which, when called by its right name, is by no means to be despised. For the pendulum substitute a limb contracted from functional disorder, and the application of the same law becomes practically useful. The operation of the Imagination is reduced to simple imaging, and can be intensified by other psychical forces.

One more exceedingly simple illustration may be adduced of the influence of what may be called expectant Imagination upon muscular action; and that is, the act of *falling*, from expecting to fall, as happens to a man walking on a narrow, but sufficiently broad, path on the top of a house or mountain. In Bacon's 'Natural History' this very example is given under "Experiment solitary, touching the force of Imagination, imitating that of Sense." The *rationale* being thus worded, "for, imagining a fall, it putteth his spirit into the very action of a fall."

The influence of Sympathy or Imitation on the body has been referred to when speaking of the signification to be attached to these terms. Southey has recorded in 'The Doctor' a remarkable instance of Imitation, in which the automatic action of the brain is strikingly exhibited:

"I remember," says a certain Mr. George Garden, in a letter written from Aberdeen in 1676, "when Mrs. Scorrgall and I were with you last summer, we had occasion to speak of a man in this country very remarkable for something peculiar in his temper, that inclines him to imitate unawares all the gestures and motions of those with whom he converses. We then had never seen him ourselves. Since our return we were together at Strathbogie, where he dwells, and, notwithstanding all we had heard of him before, were somewhat surprised with the oddness of this dotterel quality. This person, named Donald Munro, being a little, old, and very plain man, of a thin, slender body, has been subject to this infirmity, as he told us, from his infancy. He is very loath to have it observed, and therefore casts down his eyes when he walks in the streets, and turns them aside when he is in company. We had made several trials before he perceived our design, and afterwards had much

ado to make him stay. We caressed him as much as we could, and had then the opportunity to observe that he imitated, not only the scratching of the head, but also the wringing of the hands, wiping of the nose, stretching forth of the arms, &c.; and we needed not strain compliments to persuade him to be covered, for he still put off and on, as he saw us do, and all this with so much exactness, and yet with such a natural and unaffected air, that we could not so much as suspect that he did it on design. When we held both his hands and caused another to make such motions, he pressed to get free; but when we would have known more particularly how he found himself affected, he could only give us this simple answer—that it vexed his heart and brain."

The Sympathy of the whole frame with the prominent ideas of the mind, by which one muscle or organ, when aroused to action by mental states, excites other muscles or organs, should not be overlooked. The term so applied has the authority of John Hunter, who lays down the law that "every part of the body sympathises with the mind, for whatever affects the mind, the body is affected in proportion" (ii, IV, p. 167). This homogeneity between the actions of the muscles is exhibited whenever one muscle is excited by mental activity. When ideal, it follows the course which would have been pursued in reality. As in presence of an actual scene, so in Imagination, when a person vividly imagines another in danger—say from the fall of a heavy weight—how the entire attitude assumes the form of averting the impending danger! Reason tells him it is altogether useless to move a single muscle, yet not only does the law of Sympathy impel him to gesticulate, but forces the whole system into harmonious action—the eye, the facial muscles, the arms, and the legs, are thrown into violent action. When the scene is purely the work of Imagination, the effect is ordinarily feeble in character; but when a real scene is witnessed at too great a distance to render assistance, while the horror depicted in the countenance is merely the facial expression of the Emotion, the motions of the arms, trunk, and legs are the automatic representations of the forms they would actually assume if rendering help on the spot. Thus, from the wonderful fellow-feeling established by nature between mind and mind,

body and body, or between the various parts of the mental and bodily constitution of an individual, the Imagination, "sending electrical thrills through every nerve of the body," stirs, through the operation of Sympathy, the whole being to its depths; the nearest stations being in communication with the most distant outposts, and the frame changing now with its own and now with another's condition, as reflected in its own chambers of imagery.

The influence of Attention, pure and simple, upon the voluntary muscles (usually muscular sensations) is not so striking as that of some of the foregoing mental states. Directed to the pharynx, it usually occasions deglutition. If we are engaged in swallowing food it does not assist the regular action of the muscles, but disturbs it; the impression made by the presence of a morsel in the gullet, and that derived from the Attention, not being necessarily consentaneous. Attention or the direction of Thought to a part does not affect the muscles under the control of the Will so easily as those which are not; and it is the semi-voluntary character of the pharyngeal muscles which renders them, among the striped muscles, the most susceptible to its influence. The muscles engaged in articulation are also markedly influenced by Attention, though not so much so as by Emotion. In the pronunciation of words, the embarrassment caused by too long prolonged Attention to the emphasis and the aspirates is familiar to all; and the only remedy then is to pronounce them with as little thought as possible as to their correct enunciation. Thus, a school-boy becomes frequently thoroughly "pottered" by the teacher's method of tuition, ignoring the operation of this principle, and the more he is ordered to attend carefully to minute shades of difference in his mode of reading or speaking, the more difficult does it become. In stammering the influence of Attention is well known, apart from those occasions in which it is mixed up with emotional excitement.

Other examples might be given, but these, with the illustrations already brought forward under Expectant Attention, are proofs of the influence of the Attention, directed in a definite manner. In truth, as regards the voluntary muscles, it almost requires the guiding influence of an expectant idea to induce any well-marked

action. Simple attention to the finger or the foot seems, however, to render it more difficult to keep it motionless. A certain fidgetiness is begotten in the muscles of the part. Before dismissing this subject, a question of Sir H. Holland's may be briefly referred to, Whether there be any especial nervous action by which the mind's attention is directed to different parts of the body? His answer was that we must frankly admit that we do not know what nerves* are engaged in this function.

It would now be generally admitted that no distinct set of nerves is required for the action of voluntary muscles, when excited by the Attention; that whether purely automatic or partially voluntary, the hemispheres act upon the sensori-motor ganglia, and the influence is transmitted, in either case, through the medium of the same cerebro-spinal nerves as convey the mandates of the Will. In the direction of the Attention to a special point of the body, an idea may act directly upon the motor nerves (ideo-motor action); or it may increase the vascularity of one or more of the sense-centres (ideo-sensory action), and so secondarily lead to movements.

SECTION II.—Irregular and excessive Muscular Contraction; Spasms and Convulsions.

Few are the illustrations which will be given of the influence of the Intellect in causing spasms and convulsions. When we treat of the Emotions our cases will be abundant, and the difficulty will then be in selection rather than collection. A cold and abstract idea, before it generates an Emotion, is not calculated to cause excessive muscular contractions.

Mental application, even of a very slight character, may

* "Those of voluntary motion can scarcely be admitted, seeing that motion, in this sense, is no part of the effect, and that the influence extends to parts over which we have little or no voluntary power. The only employment of Will here is in giving this partial direction to the Consciousness. If, on the other hand, we suppose the nerves of sensation concerned, we must admit two several actions in opposite direction along the same tract of nerve, a condition of which, though not disproved, we have no well-assured evidence. In neither of these functions, therefore, nor in the nerves ministering to them, can we find any certain explanation of the phenomenon before us, though it has various and close relation to both, as they mutually have to each other" (xvi, p. 42).

cause a fit of epilepsy. Marshall Hall observes—"Dr. Tyler Smith has related to me an instance of an epileptic girl who experienced an attack whenever she tried to undo a difficult knot in her work, which was tapestry" (xvii, p. 24). Galen mentions a young man, a grammarian, who had epileptic fits whenever he studied hard.

It is, however, when a powerful Expectation is excited that we are most likely to witness spasm or convulsion. To obtain cases in which Expectation of the phenomenon only, without the emotion of Fear, is, however, a difficult task.

We conclude from the statement of the French Commissioners on Animal Magnetism that "upon persons endowed with sensitive nerves we have produced convulsions, and what are called crises," that the effect was brought about by leading the subjects to expect a certain result. They add, "Animal Magnetism alone, employed for thirty minutes, has produced no effect, and immediately the Imagination has produced upon the same person, with the same means, under circumstances absolutely similar, a very severe and well-characterised convulsion."

The confident assertion that a person subject to epileptic fits will have an attack, has frequently proved sufficient to produce one. Madame de St. Amour attained great reputation in France, within the last half century, for the power she exercised over nervous diseases. It is related that on one occasion a young woman was brought to her, when she demanded, "What is your complaint?" "Epilepsy," replied the girl. "Then, in the name of the Lord, have a fit now!" exclaimed Madame de St. Amour. The effect was instantaneous. The patient fell backwards, and had a violent attack of epileptic convulsions. Without Expectation, the simple thought or remembrance of previous attacks suffices with some epileptics to cause a recurrence of the fit; and still more potent is the recollection of the cause, if the cause has been of an alarming character. Ideal Emotion simply takes the place of the original feeling. In Van Swieten's Works is recorded a case of epilepsy which may be referred to this principle, that of a boy who, having been frightened into epileptic fits by a great dog, had a recurrence of the attacks whenever he heard a dog bark.

The mischievous influence of Sympathy or Imitation is exemplified in the following case which occurred at Lyons. The 'Journal des Connaissances Médico-Chirurgicales' (16th February, 1851) treats such occurrences as "excessively rare in the annals of physiology." They certainly are not very frequently reported, but occur more frequently than would be supposed from this circumstance. In a workshop where sixty women were at work, one of them, after a violent altercation with her husband, had a nervous attack. Her companions pressed round her to assist, but no sooner had they done so, than first one and then another fell a prey to the same kind of attack, until twenty were prostrated by it. The contagion appeared likely to spread through the company, but was checked by clearing the room. The reporter in the above journal, in adding that there are few precedents, remarks that history, in fact, scarcely presents more than two, the famous scenes in the Cemetery of St. Médard, and the occurrence in Boërhaave's practice which is so well known. Illustrations of the pernicious influence of this principle in connection with witnessing or reading the reports of atrocious crimes will occur to the reader, and need not be detailed here, as they do not constitute such good examples of bodily effects from Sympathy as those just referred to, though striking evidences of a blind instinct depending for its beneficial operation upon the control of reason and the moral sense, but, lacking these, leading simply to a mischievous reproduction of acts, the images of which are impressed on the mind through one or other of the senses. From what but the unreasoning operation of this law, excited by an association of ideas, could it happen that, when a sentinel of Napoleon's army committed suicide by hanging himself in his sentry-box, several immediately followed his example when they became his successors in the same box? What a practical commentary on this imitative principle of the mental constitution, that, to prevent further mischief, Napoleon found it necessary entirely to destroy the box by fire. Such facts demonstrate in strong colours the duty of not neglecting the idiosyncrasies of men and women as regards the association of external forms and internal images. Often what we call idiosyncrasies are the workings of a universal principle acting exceptionally in consequence of the

absence of certain modifying influences—a principle underlying a thousand acts, unsuspected or unrecognised until exposed by the removal of its ordinary safeguards.

Cases of spasmodic action of the pharynx, more or less assuming the form of hydrophobia, and of mental origin, are more likely to arise from a powerful Emotion than an intellectual act, and will be given under that head. One case, however, may properly be given here. Dr. Ferriar in his 'Medical Histories and Reflections' (vol. iii, p. 46), treating of *Rabies Canina*, observes:

"Dr. Percival has justly remarked in his letter to Dr. Haygarth that the difficulty of swallowing is sometimes produced by the power of Imagination alone. I met with an instance of this kind lately in which it was very difficult to prevent a person from rendering himself completely hydrophobic. Himself and his wife had been bitten by a dog which they supposed to be mad. The woman thought herself well, but the man, a meagre hypochondriacal subject, fancied that he had uneasiness in his throat, *and that he could hardly swallow anything*. When he first applied to me, a medical friend who was present asked him whether he had any sensation of heat at the pit of the stomach. He answered in the negative doubtfully; but next day I found him in bed, complaining of heat at the pit of the stomach, difficulty of swallowing, tremors, and confusion in the head. He continued to persuade himself he was ill of rabies, and confined himself to bed, expecting death for nearly a fortnight. At last I remarked to him that persons who were attacked by rabies never survived more than six days; this drew him out of bed, and he began to walk about. By a little indulgence of his fears this might have been converted into *a very clear case of hydrophobia*, and the patient would probably have died."

It is important to remark that, as pointed out by many medical writers, but by no one so forcibly as by Rush, the mere *mention* of water will in a hydrophobic person induce the recurrence of the symptoms. The image—the Imagination—causes the same effect as the attempt to swallow water. Professor Laycock would say that this effect may be produced whether there is or is not an idea present in the mind, that is,

whether the changes by which ideas are presented to the consciousness reach it or not; that which immediately precedes the hydrophobic gasp being the *ideagenous* and *kinetic* changes in the cerebrum. "The cerebral nerves being analogous to the posterior spinal nerves, and the encephalic ganglia analogous to the spinal ganglia, the spectrum of the cup of water will traverse the optic nerves and enter the analogue of the posterior grey matter in the brain, causing changes (*ideagenous* changes) corresponding to the idea of water; thence the series of excited changes will pass over to the analogue of the anterior grey matter, exciting another series (*kinetic* changes), by which the necessary groups of muscles are combined in action" (vii, January, 1845). Elsewhere, in reference to these phenomena, he observes, "the sensation or thought induced under these circumstances is only an accompanying and coexisting *result*, and not a necessary *antecedent*" (ix, October, 1854). Thought—conscious Mind—being from this point of view only an accident, it may seem to be a misnomer to speak of the influence of mind at all upon the body. But at any rate, in reference to the cases which are now under consideration, the condition of consciousness is implied, for it is by reaching the hydrophobic patient's consciousness, by mentioning to him water, by the induction of a definite idea in his mind, that the first change in the series of phenomena is excited. That ideagenous changes (paradoxical as the statement is) may take place without an idea is, no doubt, true when properly understood. It sometimes happens that the term "consciousness" is employed in different senses, and confusion is occasioned. Thus, there may be a state of the hemispherical and sensory ganglia, as in somnambulism, in which there is apparently unconscious sleep, but the ganglia respond to an idea introduced into the mind, and it is said that the individual is conscious of this particular impression. But in the ordinary sense of consciousness this may not be true. The fact is, one person assumes that to have an idea is to be conscious; and another, that an idea may be present as an excito-motor, without the mind being conscious. The terms consciousness and impressibility are frequently confounded together. That the brain may act in a reflex or automatic manner, without

consciousness as it is ordinarily understood—that the mind may not be conscious of its own operations—is indisputable; but that the brain, in regard to that which is conveyed to it from without, must be impressible is equally clear. If a man's cerebral hemispheres are so thoroughly asleep that no impression can reach them, it is clear that no idea, understood as a state of conscious mind, can be excited; the sensorial ganglia can alone respond to impressions made through the senses. That, however, the hemispheres may be in a state in which they respond to impressions conveyed to them from without, or that a latent idea (so-called) may excite movements, without the person being conscious in the popular sense of the term, is that which can and does happen. If a man, who is hydrophobic, has an apoplectic fit, and consciousness is abolished, the spinal cord may act, the sensory ganglia may act, but no "mention of water" will excite the characteristic spasm. Restore consciousness, and the mention of water has its effect. It is true it is not consciousness which does this, but in this and similar cases consciousness is clearly a condition. True, "it is not the Will or sensation which is the principal agent of movement, but the material changes in the vesicular neurine or grey matter;" still, these have been in these instances set in motion by the idea which has reached the consciousness, and which was not a merely "*quasi*-idea," but an idea to which we attract the notion of consciousness. In the epileptic woman, Madame St. Amour's command that she should have a fit would have had no effect without consciousness.

Under this Section fall those cases of cataleptic rigidity which occur in certain susceptible states of mind from the influence of Expectation. In the following illustration the effect of what is usually called Imagination, which is here synonymous with Expectation or Expectant Attention, is admirably exemplified apart from the particular muscular affection which resulted. "I had heard much," says Mr. Braid (xx, p. 82), "of an interesting case of a highly susceptible lady, so susceptible to ordinary mesmeric passes that she might be sent off into the sleep by the most simple attempt to produce it, and so sensitive of the influence of magnets that she was quite uncomfortable if a magnet were near her in any room, and in the dark she could point out any part of the

room where a magnet of very moderate power was placed, from her seeing the light it produced streaming all around it. I was kindly invited to spend an evening at this lady's house to afford me an opportunity of seeing and having more particulars of these wonders. I had the pleasure of sitting very near the lady, and of enjoying a long and interesting conversation with her and her husband, and no manifestation whatever took place during the whole time until after I had explained my views regarding the power of an act of *fixed attention*, directed to any part, in modifying the natural condition of the part so regarded. She was requested to direct her fixed attention to her hand, and watch the result, without anything being done either by her husband or any one else. She did so, and very quickly fell asleep, *and the arm to which she had directed her attention became rigidly cataleptic.*" Mr. Braid, it must be added, had a fourteen-pound-lifting magnet, with the armature unattached, in his side pocket next to the lady.

SECTION III.—Loss of Muscular Power; Paralysis.

The simple belief or conviction that a muscle cannot be contracted or relaxed is sufficient in a sensitive person, or in one in whom this sensitiveness is induced, to cause temporary loss of power. It is referred to the Imagination; in other words, the effort to carry out the desire or will is paralysed by the absorbing conviction that it will be ineffectual. The principle is the same (although the result differs) as that which we have already considered when speaking of the effect of a conviction in inducing muscular action. Dr. Carpenter gives two reasons why an action which can be ordinarily performed with ease may become absolutely impossible—"first, if a man's mind be entirely possessed with the idea of its impossibility; or, secondly, if while his judgment entertains doubts of success his attention be distracted by a variety of objects, so that he cannot bring it to bear upon the one effort which may alone be needed" (viii, p. 793).

In the following curious case, the influence of expectation,

the conviction of inability to use the muscles engaged in articulation, is well exhibited :—

"In Kleische, a small village in Germany, belonging to Mr. V. S—, a maid servant of that gentleman's family was sent a short league from home to buy some meat. She executed her orders correctly, and as she was returning in the evening, she thought she suddenly heard a great noise behind her, like the noise of many waggons. Upon turning round she observed a little grey man, not bigger than a child, who commanded her to go along with him. She did not, however, return any answer, but continued to walk on. The little figure accompanied her, and frequently urged her to go along with him. Upon reaching the outer court of her master's residence, she was met by the coachman, who asked her where she had been, to which she returned a very distinct answer. He did not remark the little man, but she still continued to do so. As she was passing the bridge, he summoned her for the last time, and upon her refusing to answer him, he told her with a menacing look, that she should be four days *blind and dumb,* and having said so he disappeared. The girl hastened to her apartment, and threw herself on the bed, *unable to open her eyes,* or *to pronounce a word.* She appeared to understand all that was said, but could not make any answer to the questions which were proposed to her, except by signs. Everything was tried for her recovery by the family with whom she lived, but all was in vain. She was incapable of swallowing the medicines which were ordered for her. At last, *on the expiration of the fourth day,* she arose in tolerably good health, and narrated what had happened to her" (lxiii, II, p. 15).

Professor Bennett records, on Professor Christison's authority, two cases which appear to be illustrative of the influence of a mental state unconnected with Emotion or with organic disease upon the power of locomotion. "The first was that of a gentleman who frequently could not carry out what he willed to perform. Often on endeavouring to undress he was two hours before he could get off his coat, all his mental faculties, volition excepted, being perfect. On one occasion, having ordered a glass of water, it was presented to him on a tray, but he could not take it, though anxious to do so, and he kept the

servant standing before him for half an hour, when the obstruction was overcome. In the other case the peculiarity was limited. If, when walking in the street, this individual came to a gap in the line of houses, his will suddenly became inoperative, and he could not proceed. An unbuilt-on space in the street was sure to stop him. Crossing a street also was very difficult, and on going in or out of a door he was always arrested for some minutes. Both these gentlemen graphically described their feelings to be 'as if another person had taken possession of their Will'" (xviii, p. 16).

Dr. Gregory gives the case (a very common one) of Mr. W—, an officer, "biologised by Dr. Darling, whose muscular motions were controlled in every possible way. He was rendered unable to raise his hands or to let them fall; he was made unable to move one while he could move the other; unable to sit down or to rise up; or to take hold of or let go an object" (xix, p. 353).

Demangeon (lx) cites from De la Roque's 'Journal de Médecine' the following case:—A woman saw a man with a paralysed arm without any ill effects; but, subsequently, on recalling the circumstance, her arm felt numb. On attempting to take up a bottle of brandy she was unable to grasp it, and let it fall. One side of the body became paralysed. Alarmed, and afraid of losing all power, she soon experienced a general loss of feeling and motion. An emetic was administered, and she was bled. On recovering from the seizure she explained, as above, the circumstances preceding the attack. We are not informed whether the symptoms entirely passed away or not. It may have been simply a case of hysterical paralysis; or an oncoming attack of real paralysis may have been hastened by the mind dwelling upon the man's palsy.

Hysterical affections of the joints are good examples of morbid conditions arising from the imagination, but are usually more or less emotional states. Sir B. Brodie observes, "the symptoms may frequently be traced to the circumstances of the patient's *attention* having been anxiously directed to a particular joint."

Actual paralysis from hard and prolonged intellectual labour should here be noted as a not infrequent result. In many of

the cases which come under our notice, there are other causes at work, such as anxiety, disappointed ambition as to literary fame, impecuniosity, &c., and no doubt it would be difficult to find a case of purely intellectual paralysis. At the same time excessive exercise of the reasoning powers must be accompanied by danger. It would be interesting to have some estimate of the number of literary men who succumb to paralytic affections, although, for the reason stated above, open to considerable fallacy. It may be remarked that these cases of paralysis do not, as a general rule, come on suddenly, but, as Dr. Richardson truly observes, are preceded by significant warnings, the most striking being "a sensation on the part of the patient of necessity during any mental effort for frequent rest and sleep; symptoms such as are described so faithfully by Johnson as belonging to the case of the poet Cowley. The cause of these cases is usually clear; it is a progressive course towards general palsy of mind and body, and it is not unlike the decline of mental activity in the age of second childishness and mere oblivion. When this condition exists, at however early a stage, the slightest shock tells on the nervous structures, and transforms suddenly the threatening malady into the extreme reality. Sudden muscular paralysis is the most common sequence of shock under this condition; it is in most cases at first a local paralysis, but it may at once be general in respect to all the muscular system under the control of the centres of volition" ('On Physical Disease from Mental Strain,' xxi, 1869, p. 360).

Gall records the case of a man who had been partially cured of a wound in the brain, and in whom, if the exertion of mind was prolonged, "the whole of one side was paralysed" (xxii, II, p. 115). In connection with this case, it may be stated that M. Lombard has made some researches into the influence of intellectual work on the temperature of the head, and observes that "all circumstances exciting the Attention and producing cerebral action, as a noise, or the sight of a person, caused an appreciable elevation. Active intellectual exertion produces still more marked effects, though even then the exaltation does not amount to one twentieth of a degree Cent. It is certainly neither to changes in the movements of the heart, nor to muscular move-

ments, that the elevation of temperature is attributable. During energetic intellectual work, the temperature of the members falls as much as one fourth in one half of a degree Cent., partly, no doubt, owing to the immobility of the body. It is at the occipital region that the changes in temperature are most apparent." (Brown-Séquard's 'Archives of Physiology,' 1868.)

CHAPTER IV.

INFLUENCE OF THE INTELLECT UPON THE INVOLUNTARY MUSCLES.

The Intellect acts upon the Heart and non-striated muscles with a power similar to that which it exercises over the voluntary or striated muscles, causing regular Movements, Spasm, and Paralysis.

The direction of thought to the Heart has, very generally, an embarrassing influence upon its regular action. It is true, emotional states exercise a much greater and more instant influence; but simple attention to its beats is usually attended by slight, and occasionally by painful, cardiac disturbance. This action of an intellectual, as distinct from an emotional, state is referred to by Sir H. Holland: "There is cause to believe the action of the heart is often quickened, or otherwise disturbed, by the mere centering the consciousness upon it, without any emotion or anxiety. On occasions where its beats are audible, observation will give proof of this, or the physician can very often infer it while feeling the pulse; and where there is liability to irregular pulsation, such action is seemingly brought on, or increased, by the effort of Attention, even though no obvious Emotion be present" (xvi, p. 17).

From the same cause, medical students when their thoughts are directed by their studies to this organ, are frequently sufferers from its disturbed action. Anxiety no doubt comes in here to aggravate the disorder, and will be referred to again under Emotion. Peter Frank himself, even when in advanced life, is stated by Romberg to have been attacked while devoting especial attention to the subject of heart disease during the preparation of his lectures, with such severe palpitations, accompanied by an intermittent pulse, that he felt assured he was

affected with an aneurism; the symptoms only ceased after the completion of his labours, and after he had enjoyed the relaxation and diversion of a journey (xxxiv, II, p. 6).

It is a common remark that medical men frequently die of the disease to which they have devoted special attention. When the coincidence occurs, the two circumstances are likely to be placed in the relation of cause and effect without sufficient reason. There is nothing, however, improbable in the popular impression; for a very slight symptom referrible to the organ especially studied by the physician, would concentrate his attention upon it, and would be likely to aggravate any previous mischief, and in the case of the heart induce irregular action and ultimately hypertrophy, or some other decidedly organic affection. And yet, probable as this seems, do not a large class of facts appear difficult to reconcile with the supposition? How explain the impunity with which thousands of hysterical persons fancy and firmly believe that they have a particular disease, dwell anxiously upon it night and day, and yet escape without any organic disease whatever? What proportion of medical students have heart disease out of those who after having their studies directed to cardiac maladies fancy they are themselves affected? A small one, we believe. Dr. Armstrong said in one of his lectures, "You will seldom be alarmed at hypochondriasis when it occurs in young subjects. I have, since I have lectured here, had the honour of curing some of the pupils of extraordinary and dangerous organic diseases by very slight means. I have cured an aneurism of the aorta by a slight purgative, ossification of the heart by a little blue pill, and chronic disease of the brain by a little Epsom salts!"

It must therefore be allowed that while attention to the action of the heart embarrasses its action, and while, if disease be actually present, it proves mischievous, there is very little evidence to prove that in a healthy organ it would induce more than functional disturbance.

Nowhere are the pathological effects of the Imagination upon the valetudinarian better satirised than in 'The Spectator' of March 29th, 1710-11, in which the writer of a letter confesses that he first contracted his ill habit of body, or rather mind, by the study of physic. He said that he no sooner

began to peruse books of this nature than he found his pulse irregular, and scarce ever read the account of any disease that he did not fancy himself afflicted with. Dr. Sydenham's learned treatise on 'Fevers' threw him into a lingering hectic, which hung upon him all the while he was reading that excellent piece. "I then," he continues, "applied myself to the study of several authors who have written upon Phthisical Distempers, and by that means fell into a consumption, till, at length, growing very fat, I was in a manner shamed out of that Imagination. Not long after this, I found in myself all the symptoms of the gout, except pain, but was cured of it by a treatise upon the 'Gravel,' written by a very ingenious author, who (as it is usual to convert one distemper into another) eased me of the gout by giving me the stone. I at length studied myself into a complication of distempers, but, accidentally taking into my hand that ingenious discourse written by Sanctorius, I was resolved to direct myself by a scheme of rules which I had collected from his observations."

There are many interesting cases of syncope from states of mind which it is not always easy to analyse and to decide upon as regards their emotional or intellectual character. Thus, if a person undergoes a sham operation of venesection, and believing that fainting will be the result, faints, we may be in doubt how far Fear has caused the result. Thus, some years ago, a medical student in Paris, on being initiated into the mysterious rites of a Masonic Society, was subjected to the above process. His eyes were bandaged, a ligature bound round his arm, and the usual preparations made to bleed him. When a pretence of opening the vein was made, a stream of water was spurted into a bowl, the sound of which resembled that of the flow of blood which the student was anticipating. The consequence was that in a few moments he became pale, and before long fainted away. Gratiolet, who relates the story, does not say whether he inquired into the proportion of cases in which syncope was caused by passing through the ordeal of membership. There is a case on record of a man who was sentenced to be bled to death. He was blindfolded, the sham operation was performed, and water allowed to run down his arm in order to convey the impression of blood. Thinking he

was about to die, he did actually die. Imagination had the same effect as the reality. But it is impossible to say how much Fear had to do with it; probably a good deal, as in the instance of the man reprieved, after his head had been laid on the block, and the fatal axe was about to fall. The reprieve came too late. The anticipation of death had arrested the action of the heart. Death predictions belong to the class in which Fear may enter largely, and yet in some instances it seems to have been simply a strongly impressed idea, unattended by Fear. How far, however, death happens through arrest of the heart's action one cannot say, but this seems by far the most likely cause. Probably it was so in the following case :—

A lady, the daughter of Sir Charles Lee, died at the hour foretold by an apparition. Believers in the reality of ghosts will perhaps not dispute the fitness of such a case as an illustration in point, if we suggest that even a supernatural visitant might, by this principle, bring about the event. The apparition, that of a little woman, appeared between her curtain and pillow at 2 o'clock, and assured her that by 12 o'clock that day she would be with her. "Whereupon," says the narrative (xxv, xxvi, p. 262), "she knocked for her maid, called for her clothes, and when she was dressed went into her closet, and came not out again till nine, and then brought out with her a letter sealed to her father, brought it to her aunt, the Lady Everard, told her what had happened, and declared that as soon as she was dead it might be sent to him. The Lady thought she was suddenly fallen mad, and therefore sent presently away to Chelmsford for a physician and surgeon, who both came immediately, but the physician could discern no indication of what the Lady imagined, or of any indisposition of her body; notwithstanding, the Lady would needs have her let blood, which was done accordingly. And when the young woman had patiently let them do what they would with her, she desired that the chaplain might be called to read prayers; and when prayers were ended, she took her guitar and psalm-book and sat down upon a chair without arms, and played and sung so melodiously and admirably, that her music master, who was then there, admired at it; and near the stroke of twelve she rose and sat herself down in a great chair with arms, and pre-

sently fetching a strong breathing or two, immediately expired, and was so suddenly cold as was much wondered at by the physician and surgeon. She died at Waltham in Essex, three miles from Chelmsford, and the letter was sent to Sir Charles at his house in Warwickshire; but he was so afflicted at the death of his daughter, that he came not until she was buried; but when he came he caused her to be taken up, and to be buried with her mother at Edmonton, as she desired in her letter."

It may be observed that, assuming that a morbid condition of the brain caused the apparition, the same condition would be a fitting one for the fatal impression received from the creation of its own fancy. Whether lowering the system by the removal of blood would add to the power of resistance may well be doubted. Probably a powerful stimulant would have saved life.

Further, is it not very possible that her condition after all was one of trance and not actual death? That she was in a partially somnambulistic state is further suggested by her increased musical ability, her master evidently being unaccustomed to such a display.

I defer speaking of the probable channel through which the mind affects the heart until the Emotions are treated of, and pass on to the lungs and blood-vessels.

The functions of Respiration are so closely connected with the Heart that the influence of the Intellect upon them may be referred to here, although involving the action of the voluntary or, as they are appropriately called, the semi-voluntary muscles. As is well expressed by Mr. Wilkinson (xlix, pp. 108–15)—"The breath awaits while the steady-fingering thought explores, and then inspires, not whatever comes, but precise information. Let the reader observe himself when he is feeling for such information, and he will find his curiosity rejoicing in periods of suspended lungs. . . . . We *hear* best in breathless attention, and *see* most observantly when the eye-thought gazes unshaken and unprompted by the lungs. It is also to be noticed that the *voice*, which consists of perceptions freed from the mind and launched into the air, is made of the material of the expirations. The mind is breathed out into the social world by the expirations and their pauses, and not by the inspirations. . . . . The

Imagination, which is the intellect of the passions, builds especial houses in the breath, or, as it is said, forms air-castles. These are its own expirations, in which it revels, for what it draws in is nothing to it, but what it breathes out is all. It does not, however, expire either to do or to die, but to run after its breaths as they sail through the air; not desiring to leave the world, but to propagate its image children in the universal imagery. The smoke of its lung-pipe keeps it busy with the pleasure of a thousand twirls. It makes its objects out of its breath, and hence we locate it among the expirations. During such imagination, accordingly, the head is held up and the breathing-tube to the very mouth levelled like a barrel; words fly forth with arrowy straightness; the inspiration is inaudible though sufficient, but the man pants audibly towards the unseen, and each pant externizes more of the breath on which the faculty pulls and feeds. When the breath-palace is built, the laws of gravity bring it to the ground; whence air-castles, as the frequent beginning of earth-castles, are not to be despised; imagination being the proximate architect of the arts and sciences. We may formulize the respiration of this faculty by saying that, during its exercise, the lungs take their airs to themselves just as the Imagination represents its objects to itself externally. This lung conceit is one means by which the body holds its own sphere, and protects it amid great fluctuations." The same writer also makes some observations on the relations between the exercise of thought and respiration which are true to nature. "Thought is still, and contemplation breathless; each involving, first, fixed breath, and, second, a small expiring; and so on, until the thought is traversed, or the effort ends and begins anew. . . . . To the senses, suspended animation is suspended consciousness; to the intellect suspended animation may be life, thought, and supreme wakefulness. . . . . Intellect touches so near upon trance, that the highest cases of either involve common phenomena, and exist in the same persons."

Blood-vessels.—Sir Henry Holland, in the Essay already referred to, observes that he has reason to think that "hæmorrhage (as in the simple case of epistaxis) is often increased by Attention, but whether by excitement to the heart's action or

by direct influence on the vessels of the part cannot easily be decided. Stimulated attention, moreover, will frequently give a local sense of arterial pulsation where not previously felt, and create or augment those singing and rushing noises in the ears, which probably depend on the circulation through the capillary vessels."

The singular phenomena of Stigmata may be fittingly referred to here, for so far as they are genuine and not caused by mechanical irritation, they arise from the mind's influence on the capillary circulation through the vaso-motor nerves. No one has treated the subject in a more luminous manner than M. Alfred Maury, who forcibly observes that ecstatic mysticism, including these remarkable appearances, is "the most striking proof of the influence of the Imagination upon the body, and is truly a miracle, in the sense of being one of those marvellous effects of the laws of thought, whose secret escapes and whose extent confounds us." He admits the fact of stigmatisation (after making the allowance he considers necessary for imposture and exaggeration), and explains its occurrence, so far at least as the reference of the phenomena to a certain group of psycho-physical facts may be regarded as an explanation, by a consideration of the influence of dreams upon the skin. In mentioning those cases in which persons have dreamed that they received blows or wounds, and in the morning have found marks of inflammation on the body, and which sometimes, in the course of a day or two, become ulcers, he observes that "just so with visionaries, under the power of the Imagination, by the concentration of the attention, the blood is directed to the place where they fancy they are affected" (xxxv, 1855).

M. Maury's description of the experience of St. Francis d'Assisi, whom he regards as the ancestor of the stigmatised, is so much to the purpose that we shall make free use of it here. One day when exhausted by fasts and absorbed in reverie and prayer, he imagined that God ordered him to open the Gospels in order that he might there learn His will. "Open me the Holy Book," he exclaimed to a friar. Three times was this done, and three times it opened at the account of the Saviour's Passion. St. Francis regarded this as a proof that he must carry his imitation of Christ much further than he had hitherto

done. Bodily mortification he had doubtless practised, and had crucified his desires, but he had not yet subjected his body to the sufferings of the cross, the penance now evidently required by the Almighty. One thought, one definite idea, henceforth occupied him—his Master's crucifixion. His Imagination revelled, so to speak, in all His sufferings. He strove while fasting more and more, and praying more and more intensely, to realise them himself. On the anniversary of the Exaltation of the Cross, resigning himself more than ever to one of these ecstatic contemplations, he imagined he saw an angel descend from the vault of heaven and approach him, the hands and feet attached to a cross. As St. Francis contemplated this vision full of profound delight and astonishment, the seraph suddenly vanished. But the pious anchorite experienced from this spectacle a strange reaction, and his whole system was more than ever permeated with the idea of the realisation of the physical sufferings of Christ in his own person. He then suffered pain in his hands and feet, and this was succeeded by inflammation so severe as to terminate in ulceration. These wounds he regarded as the Stigmata of the Saviour's Passion.

It might not be safe to take this or any other saintly narration as a *proof* of so remarkable an influence upon the body, but when viewed by the light of facts coming within our own knowledge, we have, I think, no sufficient reason for rejecting the particulars of such an experience as this. So clearly defined an idea, so ardent a faith intensifying its operation, were sufficient to reflect it upon the body. We may accept the physical result, instead of soiling the fair fame of St. Francis d'Assisi with the charge of pious fraud—always an easy escape from scientific difficulties, but one which, we venture to say, will be less and less resorted to as we understand better the delicate *nexus* which unites body and mind in inseparable union.

The periodicity of Stigmata is a further interesting illustration of the influence of Attention and Imagination upon the direction and localisation of the cutaneous circulation. On saints' days and on Fridays, the seat of the marks became more painful, and a brighter colour indicated a fresh afflux of blood

to the part—the mystics' thoughts being specially concentrated upon the Passion. M. Maury states that Ursula Aguir (1592), although she did not present the veritable signs of Stigmatisation, experienced every Friday severe pain in the place where, in a vision, she had been *stigmatised*. "An ecstatic, of whom the botanist Auguste de St. Hilaire has given a curious account in his 'Voyage au Brésil,' fell every Friday and Saturday into an ecstasy, in which she remained meditating upon and experiencing the sufferings of Christ." He adds, "The flux of the Stigmata upon Fridays has been verified also in the case of the Sister Emmerich (1824) and the Stigmatised of the Tyrol, but the fact is still more remarkable with a contemporary Mad. Miollis of Villecroze, in the Department of Var, in whom the marks supposed to signify the crown of thorns and a cross upon the chest are not permanent, but only apparent during the contemplation accompanying certain solemn occasions, as the 'fête de la croix' and the celebration of the Stigmata of St. Francis d'Assisi." In the early part of the century Count Stolberg visited her and has left on record a description of these stigmata—a description confirmed by the account which a physician published in one of the Salzburg journals of the phenomena observed in this ecstatic" (op. cit., pp. 204, 220). At the same time we should hesitate to accept this case with implicit faith in its entire accuracy.

In the following cases it is a question how far the symptoms may be referred to the combined influences of Imagination and Imitation:—Two brothers, A. B. and C. D., and the wife of one of them, presented successively nervous symptoms of a variable character which were regarded as hypochondriacal, and, but for the sex, hysterical. The first patient had been present recently when his brother D. B. had an attack of apoplexy which proved fatal; the second had witnessed the sufferings of A. B. in consequence; lastly, the wife of one of them (it is not stated which) had assiduously nursed her husband, whose state was very distressing to witness. Now, in regard to A. B.'s attack, it may be, and indeed has been, urged in opposition to the view taken by Dr. Laviroth (who records these cases as examples of disease produced "by the force of the Imagination and a kind of Imitation"), that, as respects A. B.'s attack, the symp-

toms were not those of apoplexy; for headache, syncope, &c., from which A. B. suffered, are the natural consequences of a painful impression upon the nervous system, and not necessarily the result of involuntary imitation of A. B.'s symptoms. The case shows, indeed, no more than that witnessing an affecting occurrence produces bodily effects. The second brother may have caught A. B.'s hypochondriacal symptoms through Imitation or Sympathy, and, if so, is to the point. Lastly, the wife, who suffered from restlessness, frequent pulse, headache, and apprehension, must have been affected prejudicially by nursing her husband, and therefore it is not certain, though very possible, that Imitation operated in her case. The editors of the 'Gazette Medicale' held that in none of these cases were the symptoms referrible to Imitation or Sympathy; while, to show the "glorious uncertainty" of Medicine as well as the Law, the editors of the 'Annales Médico-Psychologiques' (1851) arrived at the opposite conclusion. We cite these cases to point out possible sources of fallacy, and the necessity of sifting the evidence in each instance.

Reference may here be made to the influence of Expectation or a dominant idea upon the vessels of the brain in causing *sleep*, and in inducing waking from sleep at a certain time. In many persons, as is well known, and as Sir John Forbes demonstrated, it is only necessary to expect sleep and it supervenes, while a person impressed with the idea that it will not come may be rendered restless for hours. Dr. Elliotson, in describing a mesmeric case, says, "Mere imagination was at length sufficient, for I one day told her and two others that I would retire into the next room and mesmerise them through the door. I retired, shut the door, performed *no* mesmeric passes, but tried to forget her, walked away from the door, and busied myself with something else—even walked through into a third room; and on returning in less than ten minutes from the first, found her soundly asleep, and she answered me just as was usual in her sleep-waking condition" (xxxvi, 1846, p. 47). The expectation that a hypnotic effect will be produced by a pill often succeeds when it is perfectly inert; but still more remarkable, the effect of a purgative pill has been rendered *nil*, and comfortable sleep induced in the place of insomnia, by the

belief that an opiate has been administered. Such a case is related by Dr. Noble, the pills consisting of Ext. Col. co., gr. viii, and Calomel gr. ij! It is not more remarkable that a person's cerebral vessels should from this cause be affected, through the sympathetic, than that he should faint. The expectation of sleep, or supposed inability to remain awake, acts, as in other cases, by paralysing the normal inhibitory influence, which, according to Mr. Moore's ingenious theory,* is at work when we are awake, and so allows the unrestrained action of the cervical sympathetic ganglia by which the arteries of the brain are contracted, the amount of blood lessened, and unconsciousness induced. Apart from Expectation, mental activity causes sleep only when carried so far as to cause fatigue. "They sleep soonest who think the least; but to those with whom thinking is a necessity or a delight, how delicately poised sometimes is the alternative of sleeping and waking! The power seems to oscillate between mental willingness to withdraw from thought, and some unknown faculty which we can neither localise, nor feel, nor woo, and the accession of which to its desired supremacy waits only for the instant when we give up the attempt to command it, the effort to yield to it, the feeling even to long for it; for all such occupation of mind, as it keeps the brain active, withholds from the blood-vessels their ganglionic stimulus to contract. But at any moment when the attention of the brain is unconcentrated, instantly the ganglia become uncontrolled and primary nervous centres, and reduce the size of the arteries" (xxxvii, p. 31).

On the other hand, what is called "waking at will," must be referred to the influence of an expectant idea as much as going to sleep. Most persons can ensure waking in the morning at a certain hour by strongly fixing the attention upon the time desired just before falling asleep. This affords an excellent instance of mental activity, without consciousness of the process, the person being in fact asleep at the time the latent idea comes into operation. This familiar fact involves an automatic calculation of the lapse of time. The Fakir before passing into his hybernating trance determines when he shall awake, and strongly impresses upon his mind the day or even

* This theory applies also to states of somnambulism—natural and artificial.

the hour when he shall revive; and revive he accordingly does. The late Sir James Simpson, at a meeting of the Edinburgh Medico-Chirurgical Society, referred to a striking case witnessed by three physicians, in which a person "biologised" was commanded to sleep thirty-five hours, and did so, "with two short intervals of permitted awakening" (xxiv, 1847, p. 486).

In this connection it may be observed that it is often much easier to act automatically, in getting out of bed, when tempted to indulge in further rest, than to bring the Will to act upon the muscles. I wake from sleep, and wish to rise. Reason strongly urges the act. The Will fails; not a muscle moves. Now, if I cease to endeavour to excite movements by volition, and divert my mind to another subject, I find that while thinking of something else, I am on my feet. A parallel case is the ease with which we often remember a circumstance or a name by not thinking of it, but of another matter, after fruitless efforts to recall it by the Will. As I write, a little boy vainly endeavours to remember the tense of a Latin verb. I make him change entirely the current of his thought, and suspend the action of the Will; and the forgotten tense comes back to his memory by automatic cerebral action—the "unconscious cerebration" of Dr. Carpenter. In Macgregor's 'Thousand Miles in the Rob Roy Canoe' occurs an incident which will illustrate the same principle. He says, "when on the Meurthe three women were seen on the bank of the river, in great alarm, who searched in vain for two boys supposed to have gone away to fish, but missing for many hours." They eagerly asked Mr. Macgregor to tell them whether he had seen them, and implored him with tears to advise them what to do. "I tried," he says, "all I could to recollect; but no! I had not seen the boys, and so the women went away distracted, and left me sorrowful. But *suddenly*, when toiling in the middle of a very difficult piece of rock-work, lowering the boat [and therefore no longer trying to remember], *I remembered having seen those boys,* so I ran over the fields after the anxious mamma, and soon assured her that the children had been safe an hour ago." Such are the involuntary operations of the cerebrum, when assisted by the suspension of the Will, as exhibited in these instances; and still more strikingly, when in sleep, this unconscious activity, working

to a definite end, produces those changes in the relative force of the sympathetic ganglia and the cerebro-spinal system by which the brain is restored to its waking state. Dr. Cuthbert in a letter to the 'Medical Times and Gazette,' November 5th, 1859, on the Ulster Revivals, observes in regard to the "subjects," that "one of their most remarkable endowments was the power of producing sleep, and of awaking at a specified time."

Dr. Laycock, referring to the circumstance of young women in peculiar states of the system, "stating the hour when a watch is placed to the nucha or epigastrium under circumstances such that the patient could not have previously known it," observes, "Somehow or other people know what o'clock it is when asleep, and without watch or clock near them; and will awake at a time fixed on over night, to the exact moment. I have myself more than once awoke within two minutes, and frequently within five minutes, of the hour so fixed; for instance, at three o'clock in the morning, when my usual waking hour was seven; and I have awoke at the hour at once, from what has appeared to be a profound slumber. Now, something of this kind may occur in the cases alluded to above" (iv, p. 324).

Œsophagus, stomach, and intestines.—At the Westminster Medical Society, Mr. Quain related the following case, which strikingly illustrates the influence of involuntary Attention: "A gentleman who had constantly witnessed the sufferings of a friend afflicted with stricture of the œsophagus, had so great an impression made on his nervous system, that after some time he experienced a similar difficulty of swallowing, and ultimately died of the spasmodic impediment produced by merely thinking of another's pain" (xxxviii, p. 273).

The rejection of the contents of the stomach from a purely mental state is well exemplified in an experiment made upon 100 patients in a hospital, and reported by Dr. Durand (de Gros) in his able work 'Essais de Physiologie Philosophique.' The house-surgeon administered to them such inert draughts as sugared water; then, full of alarm, he pretended to have made a mistake in inadvertently giving them an emetic, instead of syrup of gum. The result may easily be anticipated by those who can estimate the influence of the Imagination. *No fewer*

than 80—four-fifths—were unmistakably sick. How many of the rest suffered from nausea is not stated. We need not approve of the deception of the *infirmier;* but, the experiment having been made, it is a pity so many people should have been rendered miserable without good use being made of their discomfort. In regard to misleading patients generally, even *causâ scientiæ,* one of the practical difficulties the investigation into the influence of the Imagination presents, is certainly the unseemliness of making experiments of this nature, and the danger of sullying that strict honour which by no profession is more prized or maintained than by the professors of the medical art.

The often quoted experience of Van Swieten illustrates the influence of an idea, apart from Imagination or Expectation, in exciting an act which had originally been excited by an impression from without. He relates that he once passed a dead dog in a state of putrescence, and the stench caused him to vomit. Having occasion to pass the same place, *several years afterwards,* the circumstance was so vividly recalled that he could not help vomiting. Clearer proof could not be found of the action of a mental image, or a subjective impression (a foreseeing, Unzer would say) upon the muscular system. Such a case might be, perhaps, more correctly given under the head of Sensation, for recollection of the circumstance most likely involved a resuscitation or revival of the former accompanying olfactory and nauseating sensations. In a medical point of view, associations are, from their immense influence, of the greatest importance, in nervous affections especially; and are frequently the foundation and explanation of the bodily and mental phenomena little suspected by the physician, and concealed by the patient, who is ashamed to acknowledge the circumstance.

The most trivial matter attaches certain ideas to certain places, persons, and especially articles of dress, to which they cling with a tenacity which is truly surprising, unless the influence of the association of ideas and the automatic action of the brain be considered, and when the image called up is disagreeable, will haunt the mind grievously, and may at last cause acts over which the Will has no longer any

control, and which are those of a madman. Locke calls the association of ideas a disease of the understanding, and it may certainly prove as mischievous in inducing bodily and mental diseases as it is pernicious in the employment of the reasoning powers, and the search after moral truth.

Van Swieten says (xl, p. 414), "I have seen a man who had taken a sufficiently nauseating draught, not only shudder and be nauseated, but also be frequently purged, when he merely saw the cup in which he had taken the medicine; and adds, "Sic sola idea fastidiosi remedii renovata purgantis pharmaci vices supplevit, et totum corpus turbavit." He compares this to our thinking of sadness or even feeling sad when we merely see the *word* sadness, although it has only an arbitrary connection with it.

The efficiency of an ideal purgative in exciting the peristaltic action of the intestines has been already incidentally referred to; the following case well illustrates it, and is the more valuable from being the personal experience of a medical man.

Dr. S. all his life had the greatest horror of taking medicine, although fully admitting the beneficial and necessary effects of it, and constantly prescribing it judiciously for others; he consequently never took it. After a certain period of life, however, he began to experience a torpidity of the bowels and all the consequent uneasiness, rendering it apparent to himself that relief could only be obtained by the means he prescribed to his patients, namely, the taking of medicine. After due deliberation, accordingly, and conflict with himself, he decided upon taking some, and imagining that an ordinary dose of salts would answer all the purpose, and be less nauseous than most others, he carefully mixed one, and laid it by his bedside at night to be taken in the morning when he first woke. The proximity of it, however, and the impression on his mind of the horrible dose which awaited his first waking, banished sleep from his eyes, and kept it continually before him. At length, however, he did sleep, and even then the vision did not leave him, but like the haunting phantom of the roasting pig to the slumbering glutton, it assumed various guises and positions to his mind, the difference alone being that his was more purely imaginary, as he had not swallowed the cause of the mental disturbance,

which the other had, but suffered from the anticipation. At length, however, he awoke, and so far from requiring the prepared medicine found all occasion for it removed by an effort of nature, and from that time he declares that he has nothing to do when suffering from torpid bowels but to lay a dose by his bedside at night, and that it as effectually acts as if he had swallowed it (xli, p. 64).

Crichton quotes from Pechlin the case of a student at Leyden, who, in want of a purgative, looked in the index of a medical work for the word "pill," which he supposed must be a purgative, and took one containing opium, hyoscyamus, and astringents, and was accordingly purged as he desired (lxiii, II, p. 446).

CHAPTER V.

INFLUENCE OF THE INTELLECT UPON THE ORGANIC OR VEGETATIVE FUNCTIONS.

The Intellect may powerfully excite, modify, or suspend the Organic Functions, causing changes in nutrition, secretion, and excretion, and thereby affecting the development and maintenance of the body.

The consideration we have given to the influence of Thought or Intellect, in its various aspects, upon the muscles engaged in the vascular and respiratory systems, has, at the same time, exhibited to a considerable extent its actions upon the functions of organic life. The part played by the involuntary muscles in the processes of secretion and nutrition is so important that the two cannot properly be separated, and the present is in fact a continuation and supplement of the previous chapter.

As mental activity affects the respiration, and the circulation and aërification of the blood, its influence on secretion and nutrition might be predicated even without proceeding more deeply into the causes of this influence. But the question which at once arises, whether these variations in the circulation of the blood in the organs and tissues adequately account for the alterations in nutrition and secretion, now referred to, deserves some consideration here.* Let us first notice the conclusion arrived at by Cl. Bernard. Admitting that the nervous system exercises an incontestable influence upon these processes, extending to their chemical phenomena, he maintains (xliv) that all this can be accounted for by the action of the nervous system upon the circulation of blood, and that there is no occa-

* The remarks which follow apply equally to the mode of action of the Emotions upon the same processes.

sion to have recourse to the direct influence of nerves upon nutrition and secretion. He refers to the starch transformed in a vegetable cell into sugar, due to the action of certain ferments, as also some special conditions of temperature; and points out that in animals we find the same conditions, the same ferments, with this difference only—in vegetable life the phenomenon is produced under the influence of the sap, germination, &c.; in animals, on the contrary, it is dominated by the nervous system (though that this is not essential, is seen in the embryo), "which acts directly upon the vessels, and the modifications thus produced in the vascular system react upon the chemical phenomena." He believes that both sympathetic and cerebro-spinal motor nerves act upon the vessels: the former acting as moderators, contract them and lessen the supply of blood; the latter, on the contrary, when stimulated, cause the vessels actively to dilate. "Voilà tout le mecanisme de l'influence nerveuse." The action of the chemical phenomena is augmented whenever the nerves derived from the cerebro-spinal system antagonise or paralyse the influence of the sympathetic nerves, thus allowing of more blood and a higher temperature; phenomena which may result from the suspended action of the sympathetic, or the increased action of the cerebro-spinal nerves. On the other hand, when the sympathetic is stimulated, and the calibre of the vessels is lessened, the chemical phenomena diminish. In the illustration he employs of the sub-maxillary gland, the antagonising action of the chorda tympani upon the sympathetic is supposed to cause an afflux of blood to the gland, the cells of which contain certain special chemical principles, which this blood serves to dissolve, and so excites the function of the gland. Secretion is the peculiar characteristic of the glands, as contraction is of muscle; "the accumulation of a peculiar compound within its primitive cells is the exclusive privilege of the glandular tissue; a watery menstruum is then poured forth to dissolve this substance and convey it into the excretory ducts." A sufficient supply of blood is required to create the ferment or active principle of each secretion. Motion is necessary for this, although a chemical process; and for motion, muscle is indispensable. Thus, although the nervous system cannot create new histo-

logical elements, "it sets forth their characteristic properties;" it can retard or accelerate the secretive process, and this is done by the muscular apparatus. "A new chemical compound is created through its action." On this hypothesis, therefore, the nerves do not directly interfere with organic chemical phenomena as galvanism acts upon inorganic matter, but only through the circulation. "The terminal ramifications of the nervous system do not float in the liquids of the economy," and therefore a distinct mechanism—the muscular apparatus of the vessels—is required to enable these nervous fibres "to modify the composition of these fluids" (xlv, April 27th, 1861). But sufficient as the position taken by Bernard is for the purpose of showing how varying mental states must influence the organic functions by acting upon the nerves (whether sympathetic or cerebro-spinal) which regulate the calibre of the vessels, it is not by any means proved that Bernard's exclusive position is the whole truth. Indeed, he himself, towards the close of his Lectures (Aug. 17th, 1861), seems to have some misgivings, for he observes that, however clear the action of the constrictor nerve on the vessels may be, that of the dilator is "infinitely more difficult of comprehension," appearing "to stimulate the dormant activity of the tissues to which it spreads, creating secretion in glands, contraction in muscles, and phenomena of a different nature in other parts;" and then he immediately expresses a doubt whether the nerves which give rise to these effects and those which dilate the vessels are, after all, identical. However, as to the main point, he, in the work which we have already cited, published five years afterwards (1866), still expresses himself strongly in favour of the view that the contraction and dilatation of vessels constitute a sufficient explanation of the acknowledged influence of the nervous system upon the phenomena of nutrition and secretion; and, so far as we know, he continues to be of the same opinion.* But, be this as it

* As these pages are passing through the press, the author has obtained the just published 'Leçons de Pathologie Expérimentale, 1872,' and finds that Claude Bernard repeats his sentiments in the following among other passages:—"Dans les vaisseaux comme partout ailleurs, c'est tonjours sur un élément contractile que se porterait l'action des nerfs: l'anatomie microscopique vient ici en aide à la physiologie pour demontrer dans les parois vasculaires l'existence évidente de ces

may, Professors Rolleston, Laycock, and others, who have not been content with this doctrine, have given, as it appears to the writer, good reasons for supposing that a directly trophic action may be conveyed through other than vascular nerves, and that through them, therefore, the mind may exert an influence, as well as through the circulation. The former holds (xlvi, April, 1870) that it is all but demonstrable that nerves may act directly upon cells, pigmentary, secretory, and other. He does not, however, think that it follows, considering the varying functions of nerves according to the tissues to which they are distributed, that there is a distinct set of trophic nerves. Prof. Rolleston observes that, in regard to the influence of defeat upon an army, in making it readily succumb to dysentery, scorbutus, and malaria, or of gaol life upon prisoners, there is no clear indication as to whether they are produced by vascular changes, or by the direct action of nerves which cause intracellular molecular disturbance. Other instances unquestionably show, he thinks, that nerve force can act directly on tissues without the intervention of blood-vessels. Thus Brodie records the case of a man who suffered from forcible separation of the fifth and sixth cervical vertebræ, with effusion of blood within the theca vertebralis and laceration of the cord, and in whom the respiration was imperfect, the pulse weak, and the countenance livid. He died in twenty-four hours; yet the temperature (on the inside of the groin) rose to 111°, and immediately after death it was found to be the same; the explanation being that "there was a showering down, from the irritated and isolated segments of the spinal cord, of such an amount of stimulus as was competent to throw the tissues of the lower parts of the body into active chemical change."

Professor Laycock (xlv, Jan. 14th, 1871) protests against the notion that the action of the nerves on nutrition is restricted to the regulation of the vessels, and extends their operation to the chemical changes which take place in the tissues, and to the regulation of the action of the lymphatics and absorbents. He

mêmes éléments. Si dans les glandes et dans d'autres tissus cette démonstration n'est pas donnée, ce n'est pas un motif pour admettre les nerfs trophiques agissant d'une manière chimique directe, et dont on a invoqué l'existence pour expliquer les phénomènes sécréteurs" (lxviii, p. 311).

holds that as tissues are nourished independently of vessels, the trophical system is before, and more general than, the vaso-motor. Two kinds of *vis nervosa* are here recognised—"The one, a molecular energy necessary, like heat, to all healthy tissue work; the other, regulative of its function and application. The latter, therefore, is needed, not to the end that the tissue changes shall take place, for they can and do go on independently of nerve, but that they shall take place in their proper or normal order." He assumes corresponding anatomical seats, the executive and regulative being as distinct as, and analogous to, the motor and sensory. The trophic centre is fixed in a basilar region, which includes the medulla oblongata, cerebellum, and cerebral ganglia.

While, then, we can entertain no doubt as to the fact that mental states dilate and contract the small vessels which convey nutriment to the cells of glands and tissues, and that this alone would go far to account for the phenomena which result from Attention, the Imagination, and various forms of ideational activity, it may surely be inferred from other facts that, in addition to this channel of influence, another and independent one exists, by which there is a direct communication between the mind and the organic cells. Herpes may affect the lower half of the nose, and along with this the interior of the eye may be inflamed, indicating a common cause—disturbance of the function of the oculo-nasal nerve. Mr. Hutchinson, who pointed out this circumstance to the writer, has in his possession a very interesting pathological specimen—namely, a skull in which most of the bones of one half of the head are affected by exostosis. In this case he considers nutrition to have been interfered with in the course of sensory, independently of vaso-motor nerves. Cases in which neuralgia is accompanied by herpetic eruptions point in the same direction, although it is said in reply, either that sensory irritation is reflected on the tissues through motor or sympathetic nerves, or that vascular changes constitute a common cause; but the fact remains that lesions of nutrition may be located according to the distribution of sensory and not vaso-motor nerves. A woman was admitted into the Great Northern Hospital, under Dr. Murray's care, on account of a tumour. The internal half of one eye-

brow, and the corresponding portion of eyelashes, were perfectly white, she being a brunette. Her statement was that, having gone to bed well, three or four years ago, she was attacked during the night with a very severe spasmodic tic, which lasted only a few minutes. In the morning the hair was blanched, as above described, and has remained so (xlvii, March 6th, 1869). Professor Laycock cites the observation of Brown-Séquard, that in guinea-pigs, injury of certain nerve-centres caused the hair to become white over the region deriving its nerve-supply from the centre injured. Dr. Carpenter points out that "atrophy of parts supplied by the spinal nerves is much greater when the sensory as well as the motor roots are involved, than when the latter alone are paralysed," but refers it to the fibres of the sympathetic being incorporated with the cerebro-spinal through the ganglia of the sensory nerve.

The destructive inflammation which follows division of the nerves of a part does not settle the question as summarily as one might have expected. In the case of the eye in which this change occurs after section of the fifth nerve, there is, first, the explanation that the loss of sensibility accounts for it—the eye being unable to protect itself from the irritants to which it is exposed. But this solution is proved to be unsatisfactory, because destructive inflammation does not follow facial paralysis where the organ is equally subjected to irritation from without. Then, again, there may be lesions of the trunk of the fifth nerve, which do not impair the sensibility of the eye, and yet interfere, as above, with its nutrition. "If the *outer* fibres be divided, the eye loses its sensibility; while, if the *inner* fibres be divided, the eye retains its sensibility, but nevertheless undergoes destructive inflammatory changes."

Here there appears to be a forcible reason for concluding that there are trophic nerves for the eyeball accompanying a sensory nerve, although not themselves sensory; but various conjectures have been made as to their nature. For instance, it is said they may be vaso-motor nerves derived from the sympathetic, united with this nerve. We have the experiments of Dr. Sinitzin, who removed the superior cervical ganglia of the sympathetic in rabbits. He found the result to be increased ability to resist the deleterious influence of external irritants,

so that, in short, the division of the nerve was no longer followed by destructive inflammation. This is explained by "the increased vascularity and temperature of the eye" due to the extirpation of the sympathetic ganglia, in accordance with which he observed that "irritation of the depressor nerve, by causing dilatation of the vessels, renders both eyes equally resistant against inflammation from irritating substances; and, on the other hand, if the carotid were tied, this extirpation of the cervical ganglia had no influence in checking the effects of section of the fifth nerve. . . . It is possible there may be in the trunk of this nerve, certain afferent fibres (not sensory) by which the tissues excite an inhibitory action on the vaso-motor centres, and thus produce dilatation of their vessels, and thereby regulate their own vascularity and nutrition. . . . We should thus ultimately resolve the trophic influence of the nerves of the eyeball into reflex mechanism through the fifth and sympathetic."*

A strong point in favour of the view that vaso-motor nerves are, at least, not the only channels of trophic influence, is the fact that marked changes in vascularity so frequently occur without commensurate changes in nutrition. This, possibly, would be explained by the assumption that the active dilators of Bernard admit, *when stimulated by a sensory, or, at any rate, an afferent nerve,* not only more blood, but do directly excite the functional activity of gland or tissue cells, in response to this sort of cry for help. In this way, and not because it conveys any afferent influence to the part, disturbance of a sensory nerve might cause mal-nutrition and mal-secretion; and vascular changes might, on this hypothesis, take place without being accompanied by special trophic disturbance. When the functions of organic life are influenced from a central (mental), not a peripheral source, the central nuclei of an afferent nerve may be excited, and this influence be reflected upon the efferent nerve.†

In Bernard's experiments on the nerves supplying vessels,

* 'British Medical Journal,' May 20, 1871, from which the foregoing particulars have been derived.

† See Summary at the end of the Chapter on the Influence of the Emotions upon the Organic Functions.

the evidence supports the conclusion that it is not directly through sensory, but through motor nerves that the organic functions are acted upon. Wasting of muscles follows, sometimes, at least, paralysis of motor nerves. It is remarked by Dr. Jackson that he has never seen wasting follow paralysis of the fifth nerve, and that paralysis of the gustatory nerve does not, while paralysis of the hypo-glossal does, produce wasting of the tongue.

At a discussion of the Royal Medico-Chirurgical Society (xlvii, December 9th, 1871), on a case of unilateral atrophy of the tongue, Dr. Bastian said he was by no means certain that tongue-atrophy is always associated with paralysis of the hypo-glossal, and knew of an instance to the contrary. He agreed with Jaccoud that the sympathetic fibres go to the face with the fifth pair, rather than with the motor nerves.

In regard to secretion, although vivisections seem to prove that it can be arrested or excited through vaso-motor nerves, the peripheral termination of sympathetic nerves in glands, as traced by Pflüger, suggests their direct action on the secretory process, as efferent nerves, although it is maintained that these are afferent nerves, the influence of which, proceeding *a fronte*, is reflected upon those which regulate the calibre of the vessels.

Lister's observations on the pigmentary cells in the web of a frog's foot have proved that change of colour is there "dependent upon molecular movements carried on in the interior of cells under the influence of the nervous, and under circumstances which exclude the intervention of the blood vascular system" (xlvi); and, as Professor Rolleston observes, "A force which can be seen to produce molecular movement within a pigment cell, may well be supposed to be competent to produce nutritional or chemical changes in the interior of cells of other characters."

However puzzling and contradictory, therefore, the foregoing results, as to the anatomy and physiology of trophic nerves, may appear to be, we think we are justified in declining to restrict the influence of mental states upon the processes of secretion and nutrition to the mechanical action of the vaso-

motor nerves, by which alternations of local vascularity are secured.*

Illustrations of the influence upon Secretion, of ideas—the representative states of consciousness which Imagination, both in its recollective and constructive or creative form, comprises —will readily occur to the reader. Unzer expresses the truth very clearly. "Many glands pour out their secretions from imaginations." The mental image or idea must, of course, be in relation to the secreting organ.

The salivary glands are so notably affected by ideas that they are frequently referred to. We know that the mere idea of food is sufficient to excite the function of these glands. To procure sufficient saliva for his experiments, Eberle vividly imagined acid fruits. If a tea-spoonful of coloured water be placed in the mouth under the impression that it is tincture of pellitory, the amount of saliva will be considerably increased. In the hypnotic state this would be still more effective. Just as spasms or convulsions are more likely to happen when the will is suspended and the cord acts independently, so when the controlling power is removed from the brain, its automatic action is intensified, and ideas exert much more power over the organic functions when directed towards them. There is a constant antagonism between voluntary and involuntary actions, and when anything occurs to neutralise the former, the latter rules the hour. One reason why the Emotions act so much more powerfully upon these functions is, because they are less under the control of volition than the intellectual faculties are, besides being probably in much closer anatomical relation with the nervous centres which influence the vascularity of the secreting glands.

The influence of Attention on the mammary glands is well recognised. The case of a lady is recorded by Dr. Parry, who, after the period of nursing, was accustomed to have milk secreted whenever she heard a child cry. Reflex action of the encephalic centres specially related to the organic functions is here well illustrated.

* The subject of the mode of action of vaso-motor nerves is ably treated by Dr. Meryon in the 'Lancet,' Oct. 21, 28, Nov. 4, 18, 25, 1871.

As regards the secretion of the liver, we may refer here to what is called a "bilious headache" when brought on by overwork at the desk. Any one given to study can trace such an attack from its earliest stage. Dr. Latham, of Cambridge, in a Clinical Lecture on Nervous or Sick-headaches (xxxii, March 23rd, 1872), states that he meets with a great many cases (sufficiently severe to require treatment) both in males and females, but "perhaps in an University town, owing to the large proportion of individuals of studious and sedentary habits, it may be more prevalent among males than in other places." The attacks he refers to were brought on by "prolonged mental work, protracted mental excitement, or any intense strain on the feelings." That the attack may come on during actual work, and be arrested by suspending mental application, we have ample evidence to prove. It is, however, true that, if there is actual mental excitement, "the attack may not be developed during the paroxysm, but afterwards, when the excitement has passed off, and the mental strain is somewhat lessened." He marks two stages, one of disordered sensation, including glimmering, spectral forms, and other signs of visual derangement, tingling in some portion of the body, as the arm or one side of the tongue, affections of hearing and (involving the motor centres) speech, and loss of power over the facial muscles; the other of headache and nausea, which so often occur with the sensorial disturbances, the chief symptoms being cold feet, restlessness, and the localised, more or less piercing pain felt in the head, especially (so far as our observation goes) over the left eyebrow. Dr. Latham's cases were generally marked by anæmia, a relaxed condition of the muscles and arteries; the pulse small and compressible, often slow, but accelerated on slight exertion; the general tone of the system, in short, being lowered. The headache he considers explained by the contraction of the cerebral vessels in the first instance, being followed by their dilatation; the vaso-motor nerves of the sympathetic being first excited, and then exhausted.

The secretion of gastric juice is, in all probability, increased by the idea of eating. It would be difficult, however, actually to prove it.

In like manner, thought acts upon the secretory functions of

the skin, kidneys, and the intestinal glands. Hence ideal diaphoretics, diuretics, and purgatives, exclusive of those which excite the peristaltic action of the intestines.

Crichton gives, on the authority of Pechlin, the case of a student who applied to him for advice for (*inter alia*) a troublesome collection of glairy mucus every morning. For this the doctor says, "I ordered him fifteen grains of white vitriol, with a little cream of tartar, in order to extricate the *pituita* from his stomach. He followed my advice, but by a preposterous conceit persuaded himself that the powder was intended as a sweat; and accordingly, after he had swallowed it, he covered himself all over with the bed-clothes and fell into a profuse perspiration. He then came to thank me and tell me that the powder had been attended with the desired success. I no sooner heard of a sweat than, full of wonder, I asked him if he had taken any other remedy than the one I ordered him. He assured me he had not, but that he thought the powder which I prescribed for him was to sweat him; which effect he therefore expected, and which had been effectually accomplished" (lxiii, II, 445). The above case would have been still more satisfactory as an instance of the influence of Expectation, or, as it may perhaps be termed, Expectant Imagination, had the patient not covered himself all over with bed-clothes.

The influence of intense study, long continued, in causing diabetes will not be questioned. In one of the most rapid cases which have fallen under our notice, this was apparently the cause. Dr. Richardson refers to three cases "in which the first excretion of sugar and the profuse diuresis were sequential to severe mental strain," and observes that "they constitute a hopeless class; the danger sudden, the course rapid, the fatal end sure" (xxi, 1868).

In the 'Medical Times and Gazette,' Oct. 10th, 1868, are given the results of an examination by Dr. Byasson of the renal secretion passed under the opposite conditions of repose and cerebral activity. They may be thus summarised:

1st. The exercise of thought was followed by an increase in the amount of urine. The number 1157 represented the quantity in cubic centimètres on the days of repose; 1320 on those of cerebral activity.

2nd. The amount of urea was augmented in a marked manner (indicating increased disintegration), there being about a drachm more on the day of cerebral work than on that of repose. Dr. Byasson does not doubt the contrast would be greater if complete repose had been secured. "The experiments were so arranged that a day devoted to brain-work sometimes succeeded a day of repose and sometimes a day of muscular work, and in each case there was a perfect concordance in the results."

3rd. A slight but uniform increase in the amount of the phosphates and sulphates. Anhydrous phosphoric acid is represented on the day of repose by 1·51, and on the day of active thought by 1·98.

4th. The density, the acidity, the uric acid, lime, magnesia, and potash, were scarcely affected. Chlorine was less in amount.

Dr. Byasson says that he can tell by a single analysis of the urine whether a man has passed the day in repose, or active thought, or muscular exertion, supposing the diet to have been uniform and the external conditions similar during three days so employed.

Changes in the chemical composition of other secretions are much more frequent in emotional than purely ideational states. Still, as Liebig says, "Every conception, every mental affection, is followed by changes in the chemical nature of the secreted fluids; and every thought, every sensation, is accompanied by a change in the composition of the substance of the brain," which may lead to changes, however slight and transient, in the functional activity of glands.

Passing on to Nutrition, a few observations may be made upon the unquestionable influence excited by intellectual states. If nutrition only occurs when the vital force is more powerful than the opposing chemical forces, whatever in mental action lowers vitality, will proportionately interfere with nutritive processes.

Intense mental application may be said to interfere with nutrition in one form or other. In determining, however, the general ill-effect of study upon the body, it is impossible accurately to disentangle its influence from that of loss of exercise, fresh air, &c. But that it interferes with nutrition in

many instances cannot be doubted; sufficiently so to justify the oft-quoted line from Shakespeare respecting Cassius's lean and hungry look, "He thinks too much." Still it is rather the plotting thought—the studying the overthrow of inconvenient rivals—that is here referred to, which wears away the flesh, and which justifies the expression that "such men are dangerous." On the other hand, the removal of the means of study when the intellectual pursuits have become a habit, is detrimental to health. It is said of Petrarch that "his friend the Bishop of Cavaillon, fearing lest his too close devotion to study should wholly ruin his health, which was already much impaired, having procured of him the key of his library, immediately locked up his books and writing desks, saying to him, 'I interdict you from pen, ink, paper, and books, for the space of ten days.' Petrarch, though much pained in his feelings, nevertheless submitted to the mandate. The first day was passed by him in the most tedious manner; during the second he suffered under a constant headache, and on the third he became affected with fever. The bishop now taking pity on his condition, returned him his key, and thus restored him to his previous health" (xliii, p. 4).

Descuret devotes a chapter to the "Mania of Study," and cites Rousseau's exaggerated expression "The man who thinks is a depraved animal," which he paraphrases "The man who thinks too much depraves his constitution," and enumerates among the consequences of extreme mental exertion gastritis, enteritis, hæmorrhoids, cancer of the stomach or intestines, and chronic affections of the urinary organs.

Whatever may be the injurious influence of mental work, the age to which many eminent thinkers have attained shows, at least, that it is not inconsistent with longevity, although from disuse the muscular system may become wasted. We have collected from several sources the following ages, at death, of men who have exercised their intellectual powers beyond the average:

Aristotle lived to 63; Archimedes, 75; Bacon, 66; Boerhaave, 70; Blumenbach, 88; Brougham, 90; Bossuet, 77; Sir Edward Coke, 84; Carnéades ("so intemperate in his thirst after knowledge that he did not even give himself time to comb his

head or pare his nails"), 90; Chaucer, 71; Adam Clarke, 70; Democritus, 109; Dryden, 69; Euler, 76; Euripedes, 75; Fontanelle, 100; Franklin, 84; Dr. Fothergill, 68; Galileo, 78; Galen, 90; Gauss, 78; Handel, 65; Hippocrates, 99; Hume, 66; W. Hunter, 65; J. Hunter, 65; Dr. Johnson, 75; Kant, 80; Landor, 89; Leibnitz, 70; Locke, 73; Lagrange, 77; Laplace, 78; Milton, 66; Newton, 85; Dr. Olbers, 80; Pindar, 80; Plato, 80; Pythagoras, 90; Quintilian, 80; Reid, 87; Dugald Stewart, 75; Solon, 80; Sophocles, 90; Simonides, 89; Thucydides, 80; Thales, 96; Titian, 99; Wordsworth, 80; Xenophon, 90; Zeno, 98; Zimmermann, 67.

In some of the foregoing examples it must be remembered that, though life was prolonged, the organ of mind itself was completely worn out.

> "With curious art, the brain, too finely wrought,
> Preys on itself, and is destroyed by thought."

Madden, in his 'Infirmities of Genius' (quoted by Dr. Sweetser), has endeavoured to estimate the relative longevity of different classes of authors. The natural philosophers in his table are at the top, their age averaging 75. The poets are at the bottom, who average 57. Caspar gives the average age of clergymen at 65; merchants, 62; clerks, farmers, 61 each; military men, 59; lawyers, 58; artists, 57; medical men, 56. It is obvious that the element of which we are in search is only one of many in these various occupations. It might be expected that, as appears above, medical men would be shorter lived than clergymen, without reference to mere brain work; taking the deaths, however, of twenty-two distinguished members of the former profession in England in 1870, their ages ranged between 75 and 76. As to the natural philosophers (mainly mathematicians) and poets, whether or not statistics comprise a sufficient number of cases, it is highly probable that the greater longevity of the former is a fact. If Wordsworth is a marked exception, he is also exceptional in the character of his poetry. He was more philosophical than emotional. Everything goes to prove that purely intellectual pursuits influence the organic functions much less powerfully than pursuits involving the passions. It shows the necessity of distinguishing between different forms of mental manifestation; the much closer connection which some

mental processes have with the bodily organs than others; the far greater tendency some have to interrupt and suspend their operation than others. Thus, it is obvious that Sir Isaac Newton's intense concentration of thought did not imperil the action of the heart, while John Hunter's intense indignation suspended its action. All forms of disease are indiscriminately laid at the door of study by Tissot, namely, gout, tumours, aneurisms, inflammations, scirrhosities, ulcers, dropsies, baldness, apoplexies, convulsions, &c.; but it would be altogether opposed to medical experience to assert that the chances of inflammation or aneurism, and apoplexy or convulsions arising from study, are equal. An aortic aneurism or a dropsy is much more likely to result from passion or other sudden emotional action than from thought.

Under this division reference should be made to the influence which we cannot doubt that mental states may, under favorable circumstances, exercise upon absorption. Professor Laycock has maintained "the possibility of a lymph deposit being absorbed from an opaque cornea by the daily direction of the Attention to the part for a prolonged period by means of mesmeric passes" (vii, Oct., 1851). If this be so, we have a fact, the principle contained in which forms a most important basis for the practical treatment of some diseases. It is in entire accordance with the physiological law laid down by Müller: "An idea that a structural defect will certainly be removed by a certain act increases the organic action of the part" (iii, p. 1396). The application of this law—one which we desire to bring out here in bold relief—belongs, however, to the Chapter on the treatment of disease by psychical agents.

In concluding the consideration of the Influence of the Intellect upon the Body, it is important to have clearly in view:—

1. Intellectual States, the result of impressions made upon the senses from without, or consisting of purely ideal states, whether these be formed by recollective or creative Imagination (the simple remembrance of sensations excited by the outer world, or so combined as to construct new forms), cause Sensation, Motion, and important changes in the Organic Functions of the body.

2. These ideal states may be as vivid and operative as if actually induced by real objects acting directly upon the sensory nerves.

3. In the ideal states, the bodily changes correspond to the ideas present in the mind, and are themselves involuntary; illustrating the automatic action of the hemispheres upon the sensory, motor, and sympathetic centres.

4. The Muscular movements which express mental states (gesture language), correspond in great measure to those movements which arise from impressions from external stimuli on the peripheral expansion of sensory nerves. They are figurative, and hence verbal expressions also are applied in common to both; in the one case intended to be literal, in the other metaphoric. This analogous language, thus applied to ideal and actual states, may either be explained on the principle that the encephalic seats of both are identical, or that ideational changes always tend to pass downwards to the motor and sensory centres.

5. In both mental states—the ideal and that excited by sensible objects—the Sensorium may be placed in exactly the same condition, both as to kind and degree of change, the stimulus proceeding from within in the one case, and from without in the other; the mind in the former instance always referring the sensation to the peripheral end of the nerves.

PART II.

THE EMOTIONS.

CHAPTER VI.

GENERAL PSYCHOLOGICAL AND PHYSIOLOGICAL PRINCIPLES.

I WISH to say a few words in regard to the sense in which the term Emotion is here employed, though my object throughout these observations is to present *Illustrations* of the action of Mind upon Body, rather than to enter into the metaphysical questions which might be considered in connection therewith.

Every one is conscious of a difference between a purely intellectual operation of the mind and that state of feeling or sentiment which, also internal and mental, is equally removed from (though generally involving) a bodily sensation, whether of pleasure or pain; and which, from its occasioning suffering, is often termed Passion; which likewise, because it moves our being to its very depths, now with delight, now with anguish, is expressively called Emotion—a true commotion of the mind, and not of the mind only, but of the body;* thus subjectively

* Hence the not infrequent practice of speaking of *mental* emotion to distinguish it from bodily commotion. Indeed, a writer on the Passions (Dr. Cogan) goes so far as to say "Emotions are principally and primitively applicable to the sensible changes and visible effects which particular passions produce *upon the frame* in consequence of a particular agitation of mind." It is never employed in this sense in the present work, in which Emotion is regarded as the state which causes these effects, and therefore as mental. It is very certain, however, that our notion of what constitutes an emotion is largely derived from its physical accompaniments, both subjective and objective.

rendering us conscious of the tumultuous mental movements which have arisen, and objectively manifesting to the outer world the signs of the disturbance within; the climax being the "mens emota," or crazy distraction, of Latin writers. We can, then, easily recognise a condition which differs from any of those states of consciousness which, in reference to their influence on the bodily organs and tissues, we have been considering; differing also from the Will; and yet, as an idea may instantly excite emotion, and *vice versâ*; and as the emotions form motives which are rapidly followed by acts of Will; ideational, emotional, and volitional states are intimately bound together.

We sometimes apply the word Emotion to the simple (however special) state of mental pleasure or pain; at others, to a compound state, which includes the idea in immediate relation with it. Thus, a painful mental feeling may exist, and, until we know to what it refers, we can only term it an emotional state; but if we find it arises out of the apprehension of evil, we call it Fear, a specific emotion. We cannot, therefore, in considering the specific emotions, and passing beyond mere pleasure and pain of mind, get rid, if we would, of an ideational element; one which determines the character and direction of the purely emotional feeling which it generates. The term Emotion will be used both in its simple and compound signification, though it may occasionally be convenient to designate the former as Emotion *proper*. While, therefore, endeavouring to distinguish, so far as is practically useful, emotional and intellectual states of mind, it will frequently happen that they will be inevitably blended together, and that under the head of Emotions, employed in a broad sense, we shall treat of those compound states * which, strictly speaking, include an ideational or intellectual, as well as an affective or emotional element.

When our desires are gratified, there results mental pleasure —Joy. When, on the contrary, they are disappointed, there arises mental pain—Grief or Sorrow. Such are emotions as

* The word Passion might be used to include the idea of a certain attainable gratification, and the emotion or feeling which is associated with it, while the word Emotion might be always rigidly restricted to the latter state; but as custom has rendered the passions and emotions synonymous, we shall probably avoid confusion by pursuing the course indicated in the text.

regards their quality, but they vary also in their quantitative character. Again, they may be manifested in very different degrees of intensity and force, from the slight ripple to the resistless wave; and lastly, they may differ in their persistence. It is obvious that, as these characters vary, the influence of the emotions upon the body will be modified.

It is well pointed out by Mr. Haweis in the 'Contemporary' for December, 1870, that Emotion *proper* "consists of infinite varieties of mental temperature; that upon these atmospheres of the soul depend the degree and often the kind of actions of which at different moments we are capable; and that, quite apart from different ideas, the emotional region may be dull, apathetic, eager, brooding, severe, resolute, impulsive, &c." He shows that each of these states may exist and pass away without being clothed with any appropriate set of ideas; "of course in a thousand instances they are so attached; for, as thought is always seeking emotion, so is emotion always seeking thought; and the atmospheres of the soul may be said to be constantly penetrated by crowds of appropriate thoughts, which take their peculiar colour and intensity only upon entering the magic precincts of Emotion."

States of consciousness involving Emotion may be variously classified, but all classifications are more or less arbitrary, and we shall not pretend to give one which is either complete or reduces them to their simplest form; but the following grouping of the feelings will be found useful for our present purpose. Those in the first division are antagonistic to those in the second; and, on the whole, the former involve pleasurable or elevating, and the latter painful or depressing, Emotion. The first four relate mainly to the individual—to self; they are contractive in their character. The remainder refer to others; they are essentially expansive.

I.

1. **JOY**, and its various forms or synonyms, Contentment, Cheerfulness, Mirthfulness, and the intenser states of Rapture and Ecstasy.

II.

1. **GRIEF** or Sorrow is, in its various stages and degrees, synonymous with Sadness, Affliction, Distress, Discontent, Melancholy.

2. **HOPE**, which has been referred to in connection with the Imagination understood in its broad medical sense, expects—has *faith*—that a pleasurable event will happen, and is the opposite of Despair.

2. **DESPAIR**, the antithesis of Hope and Faith.

3. **SELF-ESTEEM**, Self-complacency, Self-reliance, culminating in Pride or Conceit, is an essentially selfish feeling, opposed to Modesty, Humility, and Cringing. Tends to assume the form of Scorn, Contempt, Disdain, and Impudence.

Love of Approbation, or Vanity, is, according to Bain, the emotion of Self-esteem when it "takes a somewhat different turn." He thinks that the state of being admired by self is more elementary than that of being admired by others. Allied to Ambition.

Jealousy or Envy is the common result of Self-love.

3. **HUMILITY**, Modesty, Self-abasement, Remorse; the lowest and ignoble form—Cringing.

4. **COURAGE**, Self-possession, or Confidence, implies energy; is the opposite of Fear.

4. **FEAR**, and its acute or sudden form of Fright, and intenser form of Terror or Horror, with the minor ones of Faintheartedness, Anxiety, and Care, though the last may be regarded as gaining in chronicity what it loses in intensity. When epidemic, Fear assumes the Panic form. Allied to Suspicion.

Wonder and Astonishment

5. **CALMNESS**, the opposite of Anger. Self-control implies that there is an emotion to repress.

6. **LOVE** includes the love of the true, the beautiful, and the good, but is mainly applicable to the affection between human beings, in their various relations of mother and child, husband and wife, &c.

Admiration of another more than of self is the foundation of Veneration, Adoration, or Reverence.

Wonder or Astonishment, when pleasurable, is a form of Admiration.

7. **BENEVOLENCE** or Generosity is a form of Sympathy, Compassion, or Pity—a mixture of Love and Sadness. Involves "the endeavour to free that which we pity from suffering" (Spinoza). "Pity is akin to Love." This is a mixed state, which excites painful as well as pleasurable feeling.

or Surprise, when painful, may be classed with Fear.

Shame is the fear or dread of being ill-thought of by others (Bain).

5. **ANGER** and its aggravated phases of Rage, Fury, Wrath, or what is commonly understood as Passion; leading to Scorn, Contempt, Disdain (love of self and hatred of another); closely allied with the more noble form of Indignation.

6. **HATE**, the ignoble and more chronic form of Anger, leading to Revenge; the antithesis of Love.

7. **MALEVOLENCE**, Misanthropy, Avariciousness; the direct opposite of Benevolence or Generosity.

Of emotional states referred to in the succeeding illustrations, the most important will be those which arise in connection with Grief, Despair, Fear or Fright, Anger or Rage; Joy, Hope, Pride and Confidence. Obviously some of the mental states enumerated in the foregoing classification are felt to be less emotional in their character than others; yet they can hardly operate without involving feeling of a certain kind, and they fall under the designation of Emotions understood in the broad and complex signification. They are Passions, in one of the many senses attached to the word; and although it is true they do not so markedly affect the body as anger, &c., they have, at any rate, outward physical signs which cannot be overlooked. When Bichat spoke of the Passions, he evidently had in view such emotions as anger and joy, which so remarkably influence the organic functions. His editor, M. Cerise, who places the strictly emotional element of the sentiments or passions in the sympathetic, and the ideal element in the brain, complains of Bichat's confusion of terms, and of his location of the whole, instead of a part, of the passions in the visceral or ganglionic system. "All that Bichat says of the seat of the passions, ought to be restricted to the emotions."

These remarks on the definition of Emotion have insensibly led us into the anatomical and physiological questions which arise in connection with it; and without entering minutely into their consideration,* we shall here pursue the subject a little further. Cerise, as we have said, believes that Emotion proper has its seat in organic life, while the desires, or sentiments, with which such emotion is associated belong to the brain. According to his view, the epigastric centre is the focus where, under the form of sentimental emotions, the various general conditions of the organism designated "thoughts" on the one part, and the impressions and affective ideas on the other, are really felt, or where, so to speak, their echo is heard. He does not pretend that it is easy to circumscribe it anatomically, since it is not composed of a special apparatus, but rather an indefinite one; so that the emotional echo which there takes place does not offer any very distinct character, if the *idea* of the cause or of

* The reflex or automatic character of emotional movements is referred to in Chapter I, in connection with the doctrine of the reflex action of the brain.

the object of the emotion does not convey to it the precision which it lacks. He remarks that, although in most men the epigastric emotion is very obscure, it is sufficient to prove to us that it occurs in a ganglionic focus communicating with one or more sensory or motor nerves—an intermediate *appareil* between the general conditions of the organism and the brain; between, in other words, organic and animal life. All these conditions are, he considers, completely met by the *Solar plexus* of the sympathetic (li, pp. 306-7).

Whether we employ the term Emotion, however, in a broad or narrow sense, we must entirely decline to locate it in the sympathetic, and can only regard the sensation experienced at the epigastrium as one of the many *results* of emotional excitement, hereafter to be considered.

Dismissing, then, as wholly untenable the theory which would find a seat for the emotions in any of the sympathetic ganglia, or, in short, in any other region of the body than the encephalon,* let us consider to what portion of it they may probably be referred.

It is striking to observe how many cerebral physiologists have arrived at the conclusion that the emotions are connected in some special way with the medulla oblongata, or the adjoining encephalic ganglia; or employing the term Sensorium or sensorium commune in the old sense of Unzer, who included in it —besides the medulla spinalis—the medulla oblongata, the optic thalami, and pons Varolii, it may be said that to this region of the cerebro-spinal axis they have agreed in assigning a more direct connection with the emotions than to any other part of the nervous system. Thus Willis referred their seat to the pons Varolii; and Dr. Todd to "the posterior and superior part of the meso-cephale" in the following passage (lii, p. 283): "Emotions are, for the most part excited through the senses. . . . . But emotions may likewise be produced by intellectual change. . . . Now, emotion may give rise to movements independent of the Will. The extraordinary influence of emotion on the countenance is well known, and this may affect

* The term Encephalon is always employed, in this work, in its comprehensive sense of the contents of the skull; the term Cerebrum is restricted to the hemispheres.

one side of the face, which is paralysed to the influence of the Will, or it may excite movements of the limbs, even when the Will can exert no control over them. From these facts it is plain that that part of the brain which is influenced by Emotion, must be so connected that the convolutions may affect it, or be affected by it; that it may be readily acted on by the nerves of pure sense; that it may influence the spinal cord and the motor nerves of the face when the ordinary channels of voluntary action have been stopped. No part possesses these conditions so completely as the superior and posterior part of the mesocephale, which we have already noticed as concerned in acts of sensation. Is an emotion excited by an impression made upon one of the senses? This part becomes directly affected, and through the optic thalamus, the emotional feeling causes intellectual change. The working of the intellect, on the other hand, may act on the seat of emotion through the same channel; and an excitement of this part may produce movement of a limb, or of all the limbs, by its influence on the spinal cord through the olivary columns."

Brown-Séquard (1860, lviii, p. 226), referring to Dr. Todd's views, observes that he has given some good reasons in their support, adding, "I am ready to admit that the pons Varolii, particularly by its part connected with the roots of the auditive nerve, is a portion of the centre of emotional movements, but not the seat of the whole of this centre. The medulla oblongata, I think, is also a part of this centre."

Dr. Carpenter, writing in the October number of the 'Brit. and For. Med. Rev.,' 1846, observed that "the occurrence of ideas in the cerebrum may produce feelings of pleasure or pain in the sensory ganglia analogous to those which are produced by sensations; that the tendency to the recurrence of a certain class of ideas constantly connected with feelings of pleasure or pain, constitutes what is known as emotion, desire, or propensity; and that this is composite in its nature, involving the cerebrum for the formation of the ideas, and the sensory ganglia for the feelings with which they are associated." Dr. Carpenter reconciles these views with Gall's doctrines of the emotional as well as purely intellectual functions of the hemispheres, by supposing that there are such classes of ideas as those grouped

under "benevolence," "combativeness," &c., although the pleasure attending the act of entertaining them is not seated in the hemispheres, but elsewhere. Essentially the same views are expressed in his 'Human Physiology,' 4th edit., 1853, and the author has ascertained that he continues to hold them, although he observes (in a letter dated Feb. 29th, 1872) that "it is impossible to give any *definite* reasons why the thalami should be regarded as the special seat of the Emotions. We do not *know*, in the first place, that they are the seat of common sensation; but the evidence of Comparative Anatomy seems to me unmistakably to point to the distinctness between the Sensorial Tract and the Cerebrum; and the phenomena of Unconscious Cerebration indicate that cerebral changes are only brought to consciousness through their acting on the sensorium commune, through the "nerves of the internal senses." Now, the Sensorial Tract, or some part of it, would seem to be the seat of the emotive or affective states, which immediately link themselves on either to sensations or to ideas; the impressions that produce the former coming by the sensory nerves, the latter by the nerves of the internal senses. For they are often so closely connected with the sensorial state that it is difficult to separate the two. Further, it seems clear that the emotions of the lower animals bear no proportion to the development of the cerebrum."

Mr. Dunn observes—"With Dr. Carpenter, I believe the thalami optici to be the seat of those inner sensibilities and feelings which are associated with the emotional states." "Closely allied with the social propensities and human affections are the emotional states, and in them ideation is equally involved; for, alike in the composite nature of each and of all, there is present an *intellectual element* as well as *sensorial feeling*. Emotional is essentially different from common sensibility. We cannot identify hopes and fears, joys and sorrows, with the simple elementary feelings of pleasure and pain. The emotional differs from the sensational consciousness; they are distinct mental states. Still, the simple, elementary, emotional sensibilities and impulses, like the instinctive feelings, are strictly consensual, and have their seat in the *sensory ganglia*; and, as automatic functions of independent nervous centres, they may

be brought into play through purely sensational channels without the agency of volition or thought. . . . . And thus we see that the two great centres of emotional feeling in the encephalon—the thalami optici and corpora quadrigemina, placed midway between the cerebrum and the external organs of sense—may be played upon, and roused into action through either, from below or from above; upwards, from the outer world, by the appropriate stimulus upon the nervous vesicular expansion of each of the external organs of sense; downwards, from the cerebrum, from the inner or psychical world, by the flow of our thoughts, and the workings of ideo-dynamical, emotional, and moral agencies in our cerebral organs" (ix, 1856, p. 402, 1857, p. 151).

Dr. Noble, of Manchester, in an able and suggestive book published in 1858 (lxv), enunciated views which are a modification of those put forth by Dr. Carpenter, inasmuch as he considers the optic thalami and corpora striata as the site of Emotion, and the corpora dentata that of sensation; while, as regards the psychology of Emotion, he does not believe that it consists of mere mental pleasure or pain, but that, irrespective of this, we *feel* in a characteristic manner in various intellectual states. When the seat of emotional sensibility is acted upon from below by the nerves proceeding from the viscera and other parts of the body, there arise the buoyant or depressed feelings comprised under what is sometimes called the sixth sense of the Germans, *cœnæsthesis;* when acted upon from above, Emotion; or to express these relations in Dr. Noble's own words recently communicated to the writer, "I regard emotional sensibility as a form of internal feeling, distinct from sensation proper, and also from thought, and the memory of thought. I look upon the corpora striata and optic thalami, intermediate between the convolutions and the ganglia of external sensation, as the site of this inner sensibility; when active spontaneously, it forms the *cœnæsthesis,* 'the spirits;' when active under provocation from sensation, it is *propensity;* when active from thought, *Emotion,* sentiment, and so on." On this hypothesis as to the seat of emotional feeling, Mr. Morell has written, "It would harmonise extremely well with the whole observed development of our knowledge, which, commencing with a physical

impulse, appears next in the form of an incipient mental sensibility, and then expands into distinct notions or ideas, which ideas can then, in their turn, react upon the emotions. The position of the above-mentioned ganglia at the base of the hemispheres corresponds exactly with the supposed function" (op. cit., p. 129).

Dr. Noble endeavours to show, as well as Dr. Carpenter, that this view does not necessarily militate against the phrenological functions of the hemispheres; that, for instance, in "destructiveness" it may be held that "there is cruelty, manifesting itself chiefly in the course of *thought*, and there is *wrath*, as a highly excited *feeling*. When deliberate acts of poisoning and of incendiarism are perpetrated, when defenceless and helpless creatures are gratuitously tortured, destructiveness is mainly *ideal;* it is cold-blooded. When rage and fury show themselves, when, in this way, there is vivid perturbation of the cœnæsthesis, in deeds of violence—there is destructive *Emotion*" (p. 146). In this case, the vesicular neurine of a certain region of the cerebral convolutions is regarded by phrenologists as the organ of destructiveness, and this has its root, as it were, in a similar tissue in the ganglia beneath, with which it is in direct fibrous communication.

Professor Laycock, who locates in the cerebral hemispheres the egotistic instincts and propensities, the sexual and domestic instincts and moral sentiments, and looks upon the cerebellum as the centre of vegetative life and of all the processes of the organic appetites and instincts, regards the medulla oblongata "as at least the seat of the corporeal feeling of pleasure or pain." He thinks it probable "that a series of changes takes place in the great encephalic centres, which end finally in the *medulla oblongata* before the higher feelings and sentiments can be experienced;" adapted movements, however, resulting from changes therein which are wholly independent of sensation or consciousness. "Being the seat of the substrata of all those corporeal actions—cries and facial movements, by which states of consciousness are manifested—these can be and are manifested automatically." After observing that those who are accustomed to associate consciousness with all adapted movements, cannot easily comprehend the automatic nature of the violent twitches

of the face in infantile convulsions and the automatic groaning often uttered during sleep, as if expressive of great pain from the action of a morbid condition of blood or lung on the afferent nerves of the pneumogastric, and through it on the *medulla oblongata*, he adds, "there are phenomena, however, in favour of the doctrine that *the medulla oblongata is the common sensory of all conscious states—whether they refer to corporeal processes or the purely encephalic changes associated with ideas.* The cerebral and cerebellar hemispheres may be considered as extensive peripheries, having, like the corporeal periphery, the *medulla oblongata* for their centre. So that teleorganic changes taking place therein, which, in the usual states, coincide with conscious states, as ideas, feelings, or desires, may, during morbid states, pass downwards to the medulla oblongata, and there excite the activity of appropriate motor or kinetic substrata, without at the same time exciting any state of consciousness whatever. This is, in fact, what occurs in all cases of automatic or unconscious cerebral action. Possibly, it is in the *locus niger* we must look for this common sensory"* (lv, II, pp. 443, 461).

Dr. Kirkes, in his Handbook (1863), says, "it is not improbable that the sensory ganglia are the organs of those emotions and emotional acts or expressions which belong to the instincts which men and animals have in common—such as fear, anger, &c.—while through the hemispheres the mind manifests itself in its higher and peculiarly human emotions and feelings" (liii, pp. 469–70).

In his 'Principles of Psychology' (x, p. 572), Mr. H. Spencer observes that "the medulla, being the seat of all feelings, whether aroused from without or from within, it naturally happens that its undue excitement, in whatever way caused, produces through the vagus nerves like effects on the viscera—it naturally happens that sensations intensely painful or pleasurable, and emotions intensely painful or pleasurable, alike cause fainting." (He adds that syncope may be caused even by intense intellectual action.) The reader acquainted with the writings of

* "The vivisections of Brown-Séquard and Szokalski show that cries may be excited, independently of pain, by the reflex action of the *medulla oblongata*. They do not differ in their seat and origin from laughter," &c. (loc. cit.).

this psychologist, needs not to be informed that he believes in the constant co-operation of all the leading nervous centres in every thought and emotion. Still, as respects the medulla oblongata, he regards it "as the seat of emotional feeling considered as a mental state apart from the movements to which it gives rise. Not, of course, that it *by itself* can generate Emotion, but that it is that out of which Emotion is evolved by the co-ordinating actions of the great centres above it. Sensations being the ultimate elements; ideas of them being but the partial excitations of the structures in which the sensations originally arose, and emotions being compounded out of the ideas of sensations (the composition being now mainly organic); it results that the centre in which all simple feelings or sensations are brought into relation, remains to the last that in which they are localised, to whatever extent they are recombined by the actions of higher structures." (Extract from a letter to the author, March 2nd, 1872.)

I confess to rather a strong leaning to any physiology of the Emotions which recognises a special and intimate relationship between them and the medulla oblongata, or some portion of the sensory ganglia, one in accordance with the observation of Brown-Séquard, that while the various nervous centres which compose the base of the brain are the *conductors* of *voluntary* motor influence, they are the *centres* of *emotional* movements (xlvii, August 17th, 1861). The importance of the medulla oblongata in this connection is borne out by the microscopical observations of Lockhart Clarke, who regards it as probable that the power of expressing emotions and desires is dependent upon the co-ordinating functions of the olivary bodies. ('On the Intimate Structure of the Brain,' lvi, 1868, p. 318). Schroeder van der Kolk held the same opinion, and went further. He found that in beasts of prey these bodies are more highly developed than in herbivorous animals; the passions, especially anger, being accordingly much more strongly expressed in the faces of the carnivora than the herbivora. "The superior corpora olivaria appear to be organs for the involuntary or reflex expressions of the passions. . . . In birds they seem to serve for the movements of the feathers in the head and neck in passion" ('On the Med. Ob.,' lvii, p. 204). There is a

wide distinction, however (though not necessarily a contradiction), between the above proposition of Lockhart Clarke, and holding that the medulla is the seat or organ of the emotions, in the sense in which Marshall Hall employs the term when he says, "Emotion, the passions, and the sense of pain have their seat in the medulla oblongata, and act not along the cerebral, but the true spinal and ganglionic nerves" (xvii, p. 22). There may be the close relationship between the emotions and the medulla, which the muscular co-ordination referred to by Dr. Clarke implies, and yet the seat of Emotion be elsewhere; in the optic thalami,* as suggested by Dr. Carpenter, or the meso-cephale as held by Dr. Todd, or in the cerebral hemispheres themselves, as, in fact, Dr. Clarke himself believes. Schroeder van der Kolk also regarded the hemispheres (posterior and middle lobes) as the seat of the emotions.

We ought to add that in Dr. Maudsley's work the doctrine is upheld which steers clear altogether of any special connection between the emotions and the sensory ganglia. "The hemispherical cells," he observes, "are confessedly not sensitive to *pain;* still, they have a sensibility of their own to ideas, and the sensibility which thus declares the manner of their affection, is what we call emotional; and as there may be a hyperæsthesia or an anæsthesia of sense, so, also, there may be a hyperæsthesia or an anæsthesia of ideas. Certainly there do not appear to be satisfactory grounds, either in psychology or physiology, for supposing the nervous centres of emotion to be distinct from those of idea." "Emotion is strictly, perhaps, the sensibility of the supreme centres [hemispherical ganglia] to ideas" (lxiv, pp. 47, 137).

* The probability of these bodies being the seat of either common or emotional sensation is lessened if the opinion of Dr. Clarke be correct that they are parts of the central apparatus concerned in vision. He has shown, in the 'Proceedings of the Royal Society' (vol. xi, 1861, p. 364), that the optic tracts or nerves are not only connected with the corpora quadrigemina, but a considerable division enters the optic thalamus, and spreads out amongst its cells. As remarked by Dr. Clarke in a letter to the author, it is certain that we have frequent hæmorrhage and other morbid changes in these bodies without loss of Sensation, or any alteration in the state of the Emotions; and further, that although their size is in the direct ratio of that of the cerebral hemispheres, they are not so much smaller in the ox and sheep than in man as one would expect on the supposition of their being the emotional centres.

It is idle to dogmatise upon so obscure a subject, and it must be admitted that there are objections to the attempt to dissever and separately localise the intellectual and the emotional elements of mental states in which they are combined; and yet I cannot but think such a special relationship between the emotional element and the medulla must be admitted as shall explain why the passions act upon the muscles and upon the organic functions, in a way universally felt to be different from that in which a purely intellectual process acts upon them. On the hypothesis which refers the intellectual and emotional elements equally to the hemispheres, or which does not at least recognise that the power of expressing emotions is dependent upon the medulla oblongata, it seems to me more difficult to account physiologically for the popular belief of the feelings being located in the heart or breast, and for the sensations at the pit of the stomach; while the recognition, in some form or other, of an anatomical or physiological connection between the medulla oblongata and the emotions, brings the latter into close relation with the ganglionic cells of the pneumogastric, and with the alleged origin of the sympathetic.

With some difference of view, therefore, mainly on points of detail, there is a marked concurrence of opinion among modern physiologists as to the encephalic centre of emotional changes; those, at least, which involve movements; all referring it to one or other of the encephalic divisions of the old *sensorium commune*. We feel justified, then, in assuming that this region (and probably that part of it called the medulla oblongata) bears a special relation to the Emotions.

CHAPTER VII.

INFLUENCE OF THE EMOTIONS UPON SENSATION.

An Emotion may excite ordinary Sensations, may suspend them altogether (anæsthesia), or may induce excessive and morbid ones (hyperæsthesia and dysæsthesia).

Passing, now, from the consideration of the general psychology and physiology of the Emotions, we proceed in the first place to examine the interesting series of phenomena resulting from the operation of their influence upon sensation. Ever tending to be confounded with the converse succession of events, the influence of morbid states of sensibility in producing emotional disorder, its consideration requires more discrimination than that of movements. We can scarcely avoid employing language which is not strictly scientific, and can be only understood in a popular sense. Indeed, with two elements so closely allied as the emotional and sensational—mental feeling and bodily feeling—it must constantly happen that in our terms, as in reality, we confound the two together, and in this blending fail to discover which is cause and which is effect, or speak of the consciousness of corporeal pleasure and pain as if it were not itself in one sense a mental state, although only referring to the condition of the body. We justly speak of some feelings as corporeal and of others as mental, although the former state involves consciousness as well as the latter; only it has reference to the condition of something external to mind, which impresses the extremities of the sensory nerves distributed upon and in the body. So with the special senses, while consciousness is implied, it has reference to the varying state of the bodily organs, the eye, the ear, &c., as impressed by external objects. It is, however, perfectly easy, in spite of metaphysical

difficulties of this kind, to make clear what is meant by the influence of a powerful emotion upon sensation, as a part of that influence of the mind upon the body which we are endeavouring, in this work, to point out and illustrate. For example, there can be no question as to the fact that moral disgust does in some instances cause the sensation of nausea, or that distress of mind may occasion neuralgia, or fright the sensation of cold, or that the special senses may, under fear, be stimulated centrally, so as to cause subjective sensations, whether olfactory, visual, auditory, gustatory, or tactile. These facts remain of interest and importance, although the bare statement of them suggests some questions of difficulty. They are so, whether our physiology regards the functions of the hemispherical ganglia as comprising the sensational as well as the ideational elements of the passions—(see *ante*, p. 115)—or whether it relegates the former to the sensory ganglia. They are so, although not only do mental and physical sensations merge imperceptibly into each other—for we constantly witness the same results from emotional as from sensational excitement, physical and corporeal pain alike acting upon the body (as, *e. g.*, in quickening the circulation)—but mental sensations are so united with their associated ideas that it is difficult, and often impossible, to separate the purely emotional from the ideational elements of passion. It is a penalty which we pay for our classifications and divisions that, however convenient they are up to a certain point, they sometimes lead us to do violence to nature; to dissever that which is inseparable, to sacrifice in the present case, it may be, the intimate cohesion of psychical states to the idol of reducing everything in science to orders and classes.

When we start with Emotion, in its bald sense, as our first element in the series of phenomena under review, we lose sight for the time of the mental conception which has determined the character of the emotion, and thereby determined, to a considerable extent, the character of the resulting physical changes. It would be idle, therefore, to pretend that we can rigidly carry out any such division as that of emotional and intellectual, desirable as we certainly hold it to be to have these states roughly in view in psycho-physical investigations. For however

difficult it may be to free an Emotion from its intellectual accompaniment, we feel no hesitation in deciding that certain mental states are comparatively emotionless, while on the other hand there are mental states at once recognisable as essentially emotional, however much they may involve conception. We have seen that a vivid idea, definitely directed to a certain locality, may, without generating any emotion, induce a sensation. We have adduced the experience of John Hunter. "I am confident," he said, "that I can fix my attention to any part until I have a sensation in that part;" words which ought to be inscribed in letters of gold over the entrance of a Hospital for the Cure of Disease by Psychopathy. Hunter's confident assertion is the more interesting, because, drawn from his own experience, it shows that the principle is not confined in its operation to the susceptible and nervous, but operates even on men of the highest mental endowments. And if calm, impassioned thought can thus affect sensation, how much more profoundly will an intense emotion, as Fear or Joy? "For securing attention to a limited subject, the feeling of Terror is highly efficacious" (Bain). In the next chapter we shall see the striking influence of Emotion on muscular movements, but in that influence we shall also witness its action upon sensation, when the antecedent of motion. Thus the muscular action excited in vomiting is the result of the nausea we have just instanced, as a good illustration of a sensation induced by moral disgust. Subsequently, we shall study the phenomena which the emotional impulse causes in the body, perceptible by others, and in this sense objective; now, we consider those phenomena which are altogether subjective. In another sense, also, are they subjective, in that they are the result of impressions from within and not from without. While they are such states of feeling as have immediate reference to the bodily organs in their relation, ordinarily, to the external world, we approach them in a reverse order to the natural one. Disregarding the outer world and the impressions thence received by the sensory nerves, we place ourselves in the inner world of mental Emotion, and observe the influence which streams therefrom through the sensorium, inducing various sensations determined by a variety of causes.

Our starting point, then, is this:—Emotional impulses may act upon the sensory ganglia and nuclei of the nerves of sensation, so as to produce any of those sensations which are ordinarily induced by impressions upon their periphery; such sensations, although central, being referred by the mind to the peripheral termination of the nerve.

Besides, however, these direct and purely subjective sensations, sensation may be indirectly excited by changes in the neighbourhood of the peripheral terminations of the sensory nerves, which changes are induced by Emotion, but not through the channels of the sensory nerves. Claude Bernard, indeed, holds that the same nerve may transmit the sensory current in both directions (xliv), to and from the brain, but the sensations now referred to admit of a different explanation, being probably due to the influence exerted by the emotions upon the sympathetic nerves, as for example in the sensation of "creepiness" from fear, the local changes caused in the skin are impressed upon the sensory nerves at their peripheral terminations. Whenever the capillary circulation of a part is increased by emotional excitement, its sensibility is augmented, and the mind experiences sensations in the ordinary way, centripetally, although truly originating in an emotion. Then, again, a violent emotion, or persistent morbid feelings, may act directly upon the character of the blood, and the blood thus changed may affect the sensory nerves, and produce innumerable subjective sensations. The influence of the emotions on the blood has yet to be considered; this granted, the action of dysæmia in causing dysæsthesia is clear. The circulation of the blood, also, as well as its composition, is so much affected by emotional impulses, that from this cause likewise arise altered sensations, whether exaggerated or deadened. In respect to the special senses, a flash of light or a voice may be perceived, as every one knows, as a merely subjective sensation, from central congestion, and this congestion may be caused by intense Emotion.

Anæsthesia.—In cases of hysteria, in which there is a loss of sensation, it is difficult to decide to what extent this condition can be fairly referred to the abnormal state of the Emotions, and frequently the invasion of the disorder is so gradual as not to be obviously connected with any special mental exciting

cause; at the same time, the observations of many physicians would confirm the statement of M. Briquet, that "it is not rare to find it coming on quite suddenly after Emotion." He observes that the intense headache, generally present at the time, indicates the psychical origin of the disease. He makes the observation, in regard to cases of hysterical anæsthesia (of 1240 of which he gives an analysis), that whatever may be the extent of the affection, whether of the whole of one side, or of the organs of sense, it only involves the parts supplied by the cerebro-spinal system, never those supplied by the sympathetic, as the intestines, lungs, &c. We are apt, I think, to lose sight of the reality and interest of cases of hysteria in general, by too summarily dismissing them as "hysterical," instead of learning a lesson from their ætiology; as a German writer exclaims, "Woe unto him who swears allegiance to a word!"

Cases, in full, of hysterical anæsthesia may be seen in the 'Gazette des Hôpitaux' and 'Annales Médico-Psychologiques,' 1855, p. 294.

We will here only mention the case of a young woman who became the subject of hysteria at 18, and began to lose the sensibility of the skin of the upper extremities until, on her admission into *La Charité*, under Dr. Briquet, at the age of 22, it was found that throughout the surface of the body there was complete loss of feeling; moreover, she was insensible to "electro-cutaneous excitement;" the subcutaneous parts, muscles, bones, and nerve trunks were as insensible as the skin, except in a limited spot on the left side of the chest, where there was tenderness on pressure, and pain without. The sense of smell was also lost, and the sight of the left eye was imperfect.

M. Duchenne infers from this and other cases, the existence of a special "muscular consciousness," but their interest to us arises from the marked and unusual train of disorders by which the muscles and skin were affected from no other cause than an internal one, which appears to have been closely connected with emotional disturbance. There can be little doubt that while local applications and drugs failed to remove the affection, some circumstances, powerfully influencing the Emotions in the right direction, might have dispersed it in a short period of time.

Dr. Wilks (xlv, March 27th, 1869) records the case of a girl to whom he was called, who had received a great fright. She had an hysterical attack, and fell into a state in which she appeared to have altogether lost the sense of touch. As Dr. Wilks observes, there is frequently in hysteric cases an absence of sense of pain, while that of touch remains perfect.*

In an article in the 'Annales Médico-Psychologiques' (xxxv) "On Diseases of the Cutaneous Sensibility among the Insane," M. Auzouy, of Maréville, states that, in that institution, of 600 patients (including many demented, idiot, imbecile, and melancholy) he found more than half presented different degrees of cutaneous insensibility. He refers to the observations of M. Michéa, which prove the existence of anæsthesia (not as to touch, but sensibility to pain) in most afflicted with melancholia, especially among religious and suicidal lypemaniacs, and cites the case of an old man in the asylum at Dijon who received a serious wound which did not cause him any pain. The application of cupping-glasses and various irritants was not felt by him. This patient believed himself to have been dead forty years, and besought that he might be buried. By way of experiment he was literally buried up to the neck, and the only thing he complained of was that his interment was not completed. The writer observes, "I believe I have sufficiently shown that insensibility to pain is a pathological state which constitutes not solely a fortuitous event peculiar to some cases of mental alienation, but rather a very frequent symptom, of which the appearance is intimately bound up with the generality of the types of insanity. This immunity from pain, independent of the alterations of which the sense of touch may itself be the object, is witnessed in various conditions, according to the form of delirium that it accompanies; it is, in general, *proportioned to the moral lesion,* increases or decreases with it, and influences powerfully the development and progress of the diseases incident to the insane" (ix, 1860, p. 68).

The *convulsionnaires* of St. Médard serve as examples of anæsthesia of the muscles. As numbers of these persons were

* According to Brown-Séquard there are, in addition to the four distinct kinds of nerve-fibres of the higher senses (sight, hearing, smell, and taste), conductors of impressions of touch, tickling, pain, temperature, and muscular sense.

thrown into this peculiar condition by causes known to be directly and purely mental, they admit of separation from cases of hysteria of vague or unknown origin, and may therefore be fairly employed as illustrations of the influence of emotional excitement upon the sensibility of the body. They are usually complicated with disorder of the motor system, especially a spasmodic condition of the muscles. We read in Montgeron, 'La Verité des Miracles,' 1737—"Some remain two or three days with their eyes open, but fixed; the countenance pale; the entire body insensible and rigid as that of a corpse. The most severe tortures were often applied to their bodies without procuring any evidence of pain. It is not surprising that the *convulsionnaires* persuaded themselves that all the blows they courted and received on the body left no marks, when their sensibility was so benumbed. Calmeil observes that the resistance of the skin, the cellular tissue, the surface of the body, and the limbs, to blows is astonishing. "But many of these fanatics deceived themselves greatly in imagining themselves to be invulnerable, for there has been, above twenty times, undeniable proof given that many amongst them showed, after the cruel infliction of blows which they solicited, large patches of discoloration under the skin, and innumerable contusions on the surface, which had borne the most severe assaults" ('De la Folie,' t. ii, p. 386, and lix, II, p. 584).

In the case of the *convulsionnaire* Nisette, "She was struck on the head with a log, then with four logs, and then had the four members pulled in different directions. . . . . At length two men stood on her body, then one man stood on her back, two others dragged up her arms, and gave her the *strapado*. They pulled her arms and legs, one person being on her stomach, they suspended her by the feet, then balanced her by the arms and legs, a man being on her back; then they turned her round like a spit, then again dragged her by the four members, two persons also pulling from below the shoulders. This pulling continued for a long time, because there were only six persons to pull. (!) After that, they again gave her the *stapado* and the ordinary *sape à la muraille;* then they trod her under foot, fifteen persons at a time."

The insensibility to pain in these cases appears to have been

complete. The slight extent to which the internal organs suffered seems to be best explained by the extreme rigidity of the muscles, which was a marked feature of the phenomena—a rigidity so frequently produced with great ease by the hypnotic method.

The distraction of the attention from impressions made upon the sensory nerves, whether painful or pleasurable, when the mind is under the influence of powerful Emotions, notoriously interferes with or entirely prevents the mind's perception of them; this principle forms the foundation of a large class of cases of psychical anæsthesia. Rapt in ecstasy, the devotee feels neither cold nor wounds. In those cases of hypnotism in which anæsthesia, but not complete sleep, is induced, the immunity from pain arises from the occupation of the thoughts or ideas in another direction. Of course in those cases in which there is profound slumber, the insensibility is not due to the same principle, although the sleep may have been originally produced by mental influences. Mr. Braid found that if a patient *expected* an operation, his suggestions and his endeavour to absorb the mind in another subject, were apt to prove unsuccessful. This, however, does not necessarily involve emotional excitement, though it is, no doubt, often present.

The battle field constantly affords examples of the influence of an engrossing emotion in blunting sensation. In reporting the battle of Monte Rotundo (1867) a spectator writes in the 'Cornhill Magazine:'—"All day long the battle raged; the troops were fainting with hunger and fatigue. Certainly they were the liveliest, most patient set of sufferers I ever saw; *the certainty of victory chloroformed their pain.*"

In regard to anæsthesia of the senses of sight and hearing, the following are instructive and rare cases:

Pettigrew cites from Dr. Reid "the case of a woman who was almost blinded by fright, in witnessing a paroxysm of epilepsy with which her husband was affected in the night. In one eye the vision was completely destroyed; in the other the capacity of seeing was intermittent, 'going and coming,' as she herself described it, 'like the sun when a cloud passes over it'" (lxxvi, p. 101).

In the following case, deafness was caused by fright. It is

given by Sir Astley Cooper and quoted by Pettigrew (p. 99): "A child, ten years of age, who wanted to write her exercise and to scrape her slate pencil, went into the school in the dark to fetch her knife, when one of her schoolfellows burst from behind the door to frighten her. She was much terrified, and her head ached. On the following day she became deaf, and on the next, so much so as not to hear the loudest talking. Sir Astley saw her three months after this had happened, and she continued in this deplorable state of deafness."

Hyperæsthesia.—When illustrating the influence of emotional states upon vascularity, several examples will be given in which pain was present as one of the results. There are other cases in which the vascularity is either not marked or altogether secondary, and in which severe pain is the prominent and primary symptom; being the consequence of the fear of pain, or the witnessing the signs of pain in others.

During an *émeute*, some years ago, in Paris, a trivial event happened, and is related by Gratiolet (xv, p. 286), which is a good illustration of the effect produced upon sensation by psychical impressions. A company of soldiers and National Guards, engaged in the Rue Planche-Mibray, were exposed for a few moments to a murderous fire from all sides. One of the combatants received a slight contusion from a reflected ball upon the shoulder, and scarcely noticed it. After the skirmish, however, experiencing a momentary pain in the part which had been struck, and fancying in his fright he had received a more severe injury, he felt a stream of blood flowing down the side of his chest from the wound. "He distinctly felt it, yet the skin had not even been broken."

Gratiolet (loc. cit.) also mentions two medical students, engaged in dissection, one of whom playfully struck the other's extended finger with the back of his scalpel. Frightened, and imagining that he was cut, he uttered a terrible cry, and when he discovered his mistake, averred that the pain was so acute, that he thought the instrument had penetrated to the bone.

Professor Bennett's case of a terrified butcher, who, on trying to hook up a heavy piece of meat, slipped, was suspended by the arm by the hook, and when taken to a chemist, said he suffered acute agony, is well known. The hook had only

traversed his coat, the arm was uninjured, and yet through fear he cried out with "excessive pain" when the sleeve was cut off in order to allow of the arm being examined.

An excellent example of the influence of emotional excitement in the form of a fearful belief, in causing a corresponding sensation, is given by Dr. Noble (lxv, p. 120) on the authority of Dr. Whitehead:

"Mons. Boutibonne, a man of literary attainments, a native of Paris, served in Napoleon's army, and was present at a number of engagements during the early part of the present century. At the battle of Wagram, which resulted in a treaty of peace with Austria, in November, 1809, Mons. Boutibonne was actively engaged during the whole of the fray, which lasted, if I rightly remember, from soon after midday until dark. The ranks around him had been terribly thinned by the enemy's shot, so that his position at sunset was nearly isolated; and while in the act of reloading his musket, he was shot down by a cannon-ball. The impression produced upon his mind was that the ball had passed from left to right, through his legs below the knees, separating them from his thighs, as he suddenly sank down, shortened, as he believed, to the extent of about a foot in measurement, the trunk of the body falling backwards on the ground, and the senses being completely paralysed by the shock. In this posture he lay motionless during the remainder of the night, not daring to move a muscle for fear of fatal consequences. He experienced no severe suffering; but this immunity from pain he attributed to the stunning effect produced upon the brain and nervous system. 'My wounded companions,' said he, 'lay groaning in agony on every side, but I uttered not a word, nor ventured to move, lest the torn vessel should be roused into action and produce fatal hæmorrhage, for I had been made acquainted with the fact that the blood-vessels, wounded in this way, did not usually bleed profusely until reaction took place. At early dawn, on the following morning, I was aroused from a troubled slumber by one of the medical staff, who came round to succour the wounded. "What's the matter with you, my good fellow?" (*Qu'a-t-il, mon camarade?*) said he. "*Ah! touchez-moi doucement, je vous prie;*" I replied, "*Un coup de canon m'a emporté*

les jambes." He proceeded at once to examine my legs and thighs, and giving me a good shake, with a *ris de joie*, he exclaimed, "*Faites-vous lever d'abord, vous n'avez rien de mal.*" Whereupon I sprung up in utter astonishment, and stood firmly on the legs which I believed had been lost to me for ever. I felt more thankful than I had ever done in the whole course of my life before. I had not a wound about me. I had, indeed, been shot down by an immense cannon-ball, but instead of passing through my legs, as I firmly believed it to have done, the ball had passed under my feet, and had ploughed away a cavity in the earth beneath, at least a foot in depth, into which my feet suddenly sank, giving me the idea that I had been thus shattered by the separation of my legs. *Voilà ce que se fait-il le pouvoir d'imagination.*' "

It may here be noted, without detailing cases, that although, as has been shown, anæsthesia is frequently found associated with insanity, there are cases in which hyperæsthesia is equally well marked.

Striking proofs of the induction of bodily sensations by means of psychical agency, are to be daily found in the sensations produced from mental imagery of an emotional character. Anxiety causes innumerable organic sensations. A man pictures himself in a position of responsibility; delivering an important speech, for instance, in the House of Commons. This is instantaneously succeeded by a "qualm in the stomach." I do not now mean actual queasiness or nausea, but the well-known indescribable sensation referred to the pit of the stomach—the "epigastric centre;" others experience, instead, an equally well-marked sensation in the legs or in the perinæum.

Probably no sensation is more universally recognised as connected with Emotion than this instantaneous epigastric feeling, which may pass into a complete qualm in the sense of sickly faintness, or even into a qualm in the sense of its Saxon original —death. Milton speaks of "qualms of heart-sick agony," and the reader may be reminded of its psychical correlative—the qualms of conscience. Again, I may either say I am qualmish from a moral cause, or, with Pistol, "I am qualmish at the smell of leek." The sensation in the pit of the stomach forms, no doubt, the main reason why the emotions, when not

located in the heart, have been referred to the stomach by the vulgar, and to the solar plexus by some eminent physiologists. As popular opinion refers the seat of sensational impressions, not to the sensorium, but to the peripheral, or, as indeed they are often called, the sentient extremities of the sensory nerves, so does the same authority refer the emotions to the region of the stomach or breast; the reason being that mental feelings have excited the central nuclei of the nerves which supply these organs; the centre of the emotional movements being in the medulla oblongata (see p. 119). In regard to epigastric sensations, there has always been a tendency to connect the deepest feelings of the soul with this region or the umbilicus. To this spot a monk in the eleventh century directs the thoughts to be turned in order to arrive at the highest degree of mental insight. "When thou art alone in thy cell," says he, "shut thy door, and seat thyself in a corner; raise thy mind above all things vain and transitory; recline thy beard and chin on thy breast; turn thy eyes and thoughts towards the middle of thy abdomen, and search the place of the heart, the seat of the soul. At first all will be dark and comfortless; but if thou persevere day and night thou wilt feel an ineffable joy, and no sooner has the soul discovered the place of the heart, than it is involved in a mystic and ethereal light."*

Shakespeare recognises the influence of unhappy feelings on the sensations of the alimentary canal, in the passage in which Iago says—

> "The thought whereof
> Doth, like a poisonous mineral, gnaw my inwards."

Tylor says, in his 'Early History of Mankind,' that at the Berlin Deaf and Dumb Institution they push the forefinger against the pit of the stomach to express "I;" that at the Edinburgh Institution they indicate their desire or will by placing the hand on the stomach, "in accordance with the natural and wide-spread theory that desire and passion are located there."

* See Mosheim's 'Ecclesiastical History,' and Gibbon, who in quoting the passage characterises the light as "the production of a distempered fancy, the creature of an empty stomach and an empty brain."

In accordance with the metaphoric use of words, in this connection, it may be added that we speak of the *sickening* details of a crime, from the acknowledged influence it possesses in producing a state of nausea, which, if aggravated, would lead to actual vomiting. Sometimes our expressions are strictly figurative, at other times they pass insensibly into a description of the actual physical effect. The former is intended in such a phrase as—

> "My *spirit sickens* at the hateful thought."
>
> JOANNA BAILLIE'S 'ETHWALD.'

That hope deferred maketh the heart "*sick*," is a proverb as true as it is ancient. Thus Shakespeare:

> "I feel such sharp dissension in my breast,
> Such fierce alarums both of hope and fear,
> As I am *sick* with working of my thoughts."
>
> HEN. VI, ACT IV, SCENE V.

The effect produced upon the abdominal region by the emotions is recognised in the interchangeableness of the terms employed in all languages to signify the physical and the mental state. In the oldest historical work extant, we read that "Joseph made haste, for his *bowels* did yearn upon his brother; and he sought where to weep." The Heb. רחמים is literally rendered in the authorised version; the association of the two ideas is therefore met with, as might be expected from its foundation in nature, in the language of the early, no less than in the later, ages of the human race; popular language being largely justified by, though needing qualification from, the anatomical and physiological teachings of the present day. The Greeks made use of the same metaphor. In the above passage, for example, the word employed in the Septuagint* is ἔγκατα or (as in the Oxford MS.) σπλάγχνα, the intestines or bowels, the word which frequently occurs in the writings of St. Paul, as in the expression rendered by our translators "bowels of mercies" (σπλάγχνα οἰκτιρμῶν) and "straitened in your own bowels." Hence, by a curious interchange of ideas, along with verbal identity, the tenderest emotions are represented in

* The LXX in Prov. xii, 10, render it by σπλάγχνα (bowels, *i.e.* tender mercies).

the same language as that which is employed to describe the physical circumstances attending the death of Judas Iscariot.

From profane Greek authors similar examples might be cited, but the foregoing are sufficient to mark the connection which every one's consciousness and observation have, in every age, recognised between the emotions and certain abdominal organs.

One marked form of hyperæsthesia of emotional origin is seen in *hypochondriasis*, although in many cases the attention paid to the impressions is, in the first instance at least, excited by a morbid condition of some organ of the body.

We may, however, with Romberg, refuse to admit cases thus originating as properly hypochondriacal. "Hypochondriasis can only be said to exist if the mind creates new sensations, which in their turn give rise to nutritive derangements . . . The mind is productive, it creates corporeal sensations and changes; the imagination clings to its own productions, and attaches itself to a given group of sensory nerves." (xxxiv, I, pp. 184-5.)

Again, the special direction of thought to one part may cause anxiety, or anxiety may induce a person to direct his thoughts to the operations of the bodily functions. The course of phenomena in hypochondriasis is not so simple as at first sight appears. However, the fact undoubtedly remains that reflection, and especially the anxious reflection, upon any of the bodily sensations, increases them to a morbid extent, and may originate a host of imaginary disorders.

The sensation of a ball in the throat, and that of throttling, so often caused by emotion, may here be referred to. By Romberg the *globus* is regarded as a direct subjective sensation —hyperæsthesia of the vagus—and not an indirect one occasioned by spasm of the pharynx, which he does not believe to be present, for "liquids and solids pass equally well through the gullet." Sir Walter Scott said he did not know what other people feel, but with him "the hysteric passion that impels tears is a terrible violence—a sort of throttling sensation." The *besoin de respirer* is a nearly allied state, due, in emotional cases, to subjective irritation of the pulmonary branches of the vagus.

There are, however, agreeable as well as disagreeable psycho-

physical phenomena. Here, as in hypochondriasis, it is very easy to put the cart before the horse; but no one doubts that while, on the one hand, a healthy glow of bodily health acts upon the mind and causes pleasurable emotion, joy on the other hand induces that general sense of bodily comfort, or well-being, to which the term *cœnæsthesia* is often, though not quite correctly, applied, as it should include depressing as well as buoyant feeling.

Heat and Cold.—The sensations of heat and cold are notably caused by emotional disturbance.

> "I have a faint cold fear thrills through my veins,
> That almost freezes up the heat of life."

The commission appointed by the King of France, in 1784, to report to the Academy of Sciences on the claims of Animal Magnetism, reported, among other phenomena they observed, that without touching "the subject" or employing any means whatever, he experienced pain and very great warmth (*une chaleur très grande*), simply from mental excitement.

It is clear that Fear may not only cause the subjective sensation of cold, but may also reduce the temperature by its action upon the vaso-motor nerves.

Instances occur daily of cold extremities from painful emotions; warmth being soon restored, if Hope or Joy be substituted for "cold Fear."

The influence of Shame on the external ear, as well as the cheek, is proverbial. The expression "a burning shame" is not a mere figure, but involves and has its origin in the actual sensation of heat—

> "Mine ears that to your wanton talk attended,
> Do burn themselves for having so attended."

The evidence afforded by the heat experienced on the field of battle is of so mixed a character—it would be so difficult to separate the mental from the physical causes—that I should not attach much importance to it, as bearing upon the present inquiry; but as Dr. Rush has thought it worth while to regard it from this point of view in one of his remarkable essays, I cannot do less than quote his experience. "Many officers have

informed me that after the first onset in a battle they felt a glow of heat, so universal as to be perceptible in both their ears. This was the case in a particular manner in the battle of Princeton, on the 3rd of January, in the year 1777, on which day the weather was remarkably cold. A veteran colonel of a New England Regiment, whom I visited at Princeton, and who was wounded in the hand at the battle of Monmouth, on the 28th of June, 1778 (a day in which the mercury stood at 90° Fahr.), after describing his situation at the time he received his wound, concluded his story by remarking that fighting was hard work on a cold day, but much more so on a warm day. The many instances which appeared after that memorable battle, of soldiers who were found among the slain without any marks of wounds or violence on their bodies, were probably occasioned by the heat excited in the body by *the emotions of the mind* being added to that of the atmosphere" (lxi, I, p. 129). It is obvious, however, that the grounds for this conclusion are far from being satisfactory.

Another observation of Dr. Rush is more reliable, that soldiers favoured by the fortune of war would remain comparatively insensible to cold. During the American war the Philadelphia Militia, accustomed to the comforts of city life, slept after the battle of Trenton in tents and barns, or in the open air, in the coldest months of the year; yet in the course of six weeks only two were ill, and there was but one death. Dr. Rush says he can only account for the healthiness of so large a number of men under such circumstances, by the vigour infused into the human body by the victory of Trenton having produced insensibility to all the usual remote causes of disease. The reverse of this picture must be added to render it complete, although not directly referring to the influence of a certain state of mind in resisting cold. "Militia officers and soldiers, who enjoyed good health during a campaign, were often affected by fevers and other diseases, as soon as they returned to their respective homes. I knew an instance of a militia captain, who was seized with convulsions the first night he lay on a feather bed, after sleeping several months upon a mattress or upon the ground. These affections of the body appeared to be produced only by the sudden abstraction of that tone in the system, which

was excited by a sense of danger and the other invigorating objects of a military life."

Dr. Darwin relates the following case. Although the exposure to the cold of a frosty night had, no doubt, considerable influence in causing a chill in the first instance, the power of Fear in sustaining the morbid sensation of cold afterwards cannot be denied:

"A young farmer in Warwickshire, finding his hedges broken and the sticks carried away during a frosty season, determined to watch for the thief. He lay many cold hours under a haystack, and at length an old woman, like a witch in a play, approached, and began to pull up the hedge; he waited till she had tied up her bottle of sticks, and was carrying them off, that he might convict her of the theft, and then springing from his concealment he seized his prey with violent threats. After some altercation, in which her load was left upon the ground, she kneeled upon the bottle of sticks, and raising her arms to heaven beneath the bright moon, then at the full, spoke to the farmer, already shivering with cold, '*Heaven grant that thou never mayest know again the blessing to be warm.*' He complained of cold all the next day, and wore an upper coat, and in a few days another, and in a fortnight took to his bed, always saying nothing made him warm; he covered himself with very many blankets, and had a sieve over his face as he lay; and from this one insane idea he kept his bed above twenty years, for fear of the cold air, till at length he died" (lxxv, II, p. 359).*

If certain mental states affect the temperature of the body, variations of temperature ought to be of diagnostic value in regard to the state of the mind in insanity. According to Dr. Ertzbichoff (xxxv, September, 1865), "Lœwenhardt was enabled by this means to diagnose insanity in a case in which malingering was suspected. Dr. Westphal, who has devoted much time to the investigation of the subject, has obtained good results. The former places the thermometer in the axilla; the latter, in the rectum. . . . . The coincidence of oscillations in the temperature with alternations of mental

* Upon this case Wordsworth founded his poem, 'Goody Blake and Harry Gill: a true story.'

tranquillity and excitement, is of bad omen when it frequently occurs. With some insane patients, these oscillations are regular: thus, during the days of excitement the thermometer indicated 100·8° Fahr., but never exceeded this; during those of tranquillity the temperature fell to 98·6°—this oscillation continuing sometimes for six months. The pulse-variations are less regular; the pulse, it is true, also becomes more frequent during mental excitement, but this is due to the state of the patient, and not to a febrile condition, for this is not present. The researches of Louis Meyer, tending to prove the coincidence in the rise of the pulse with febrile action, increased temperature, and mental excitement, are far from being conclusive, for it may equally well be the result of incipient tubercular disease. In *mélancolie avec stupeur*, the temperature is always below the normal amount."

Hunger and Thirst.—No one will doubt that these sensations are modified—aroused or dulled—by the condition of the mind. A child hears water mentioned, and experiences a desire to drink in consequence. With the drunkard, the mental image of a glass of spirits will excite his peculiar thirst for drink. Persons are often thirsty when, as every one knows, if the attention be diverted, the sensation disappears. But apart from these examples of the influence of ideas—the imagination—there are cases in which emotional excitement tends to create thirst. Thus, it has been observed at the commencement of an engagement. Dr. Rush, in his essay on the 'Influence of the American Revolution upon the Human Body,' says he noticed thirst to be a very common sensation among both the officers and soldiers. He adds that it occurred when no exercise or action of the body could have excited it (lxi, I, p. 128). This is the more striking, because the circumstance of the mind being concentrated upon another subject failed to extinguish this sensation.

Hunger from this cause is not often experienced. Other mental images appear in this instance to occupy the attention to the exclusion of this. Dr. Carpenter relates an anecdote of himself, which illustrates this familiar fact. He adduces it as a proof that the sense of hunger *originates* in the condition of the general system, the secondary phenomenon being its *manifesta-*

tion through a particular action in the stomach, which may be overlooked when the mind is otherwise employed:

"He was walking alone through a beautiful country, and with much to occupy his mind; and having expected to meet with some opportunity of obtaining refreshment on the road, he had taken no food since breakfast. This expectation, however, was not fulfilled; but as he felt no hunger he thought little of the disappointment. It was evening before he approached the place of his destination, after having walked about twenty miles, resting frequently by the way, and he then began to feel a peculiar lassitude, different from ordinary fatigue, which rapidly increased, so that during the last mile he could scarcely support himself. The 'stimulus of necessity,' however, kept him up; but on arriving at his temporary home, he immediately fainted" (viii, p. 394).

In connection with this subject, a few words may be added in regard to the influence of the peculiar condition of the mind present in some forms of hysteria, &c., in maintaining the vital power in the absence of food. The physiologist last cited records a case in which a young lady, under his own observation, took no nourishment for three weeks, except, on some days, one or two cups of tea. "Yet the strength of the patient rather increased than diminished during this period; her muscles became firmer and her voice more powerful." In a case of delusional insanity, cited by the same writer, on the authority of Dr. Willan, the patient, a young gentlewoman, only took a little orange juice, and yet lived for sixty days. (Op. cit., p. 399.)

Even if it be thought that such cases might have resulted differently, had a "Welsh Fasting Girl Committee" sat upon them, there is quite a sufficient number of instances of fasting for shorter periods of time in abnormal states of the feelings to show their connection. The exalted mental condition of some religious enthusiasts, amounting oftentimes to a state of true ecstasy, has led in men to results as extraordinary as those observed in hysterical females.

Special Senses.—The influence of Emotion in exciting the sense of sight is illustrated by many ghost stories, visions, &c. The expression of Coleridge, in regard to this class of pheno-

mena, is a happy one. "The imagination, under (emotional) excitement, generates, and produces, a form of its own." The state of the feelings at the time will determine the character of phantasms, whether fearful or agreeable. Those who believe in real visitations from the other world, and have any knowledge of physiology, do not deny that there are subjective as well as objective ghosts.

All this is true as fact,—whether we hold that the sensory ganglia are called into activity every time we recall to the mind the localities which we have visited, or the sounds we have heard, in accordance with the position taken by Bain and others, that a sensation, and the remembrance of a sensation, involve the same portion of the brain,—or whether we believe that the mere recollection of an object is a purely ideational act,* involving only the cerebral hemispheres; while nothing short of the presence of distinct hallucinations or illusions of the senses, as ocular spectra, implies the activity of the sensory ganglia.

Are the organs of sense—the distal extremities of the sensory nerves—themselves affected by emotional excitement? In other words, is such central hyperæsthesia transmitted to the peripheral terminations of the nerves? The remarks already made on the Influence of the Intellect upon Sensation (Chapter II) apply here also, *mutatis mutandis*. It is obvious that our present standpoint does not necessarily extend beyond the central terminations of the sensory nerves. It is sufficient that we allow that these can be excited by an emotional impulse, to account for all the subjective sensorial phenomena which follow, without supposing any centrifugal change to take place in the course of these nerves or in their peripheral expansions.

We know that a man who labours under amaurosis can still behold spectra; that if he is deaf, he can still hear an audible voice; or can smell, though his olfactory nerve is destroyed;—and, therefore, it cannot be needful to suppose any centrifugal action along the course of the nerves of sense. This remains a secure position to take, even if it be true that this backward action—retransmission—can occur.† No physiologist has gone

* See p. 49 of this work.

† That accomplished physician, the late Dr. Symonds, observes—"I do not see any *impossibility* in such a transmission, when the impression is unnaturally

further than Müller in maintaining that it can and does; in fact, I venture to think that, while admitting that the internal parts of the apparatus of vision are alone essential to the production of certain phenomena, he confounds two views which are distinct —the one, that sensorial phenomena of subjective origin are as truly states of sensation as those excited objectively; the other, that, in the former case, there is usually a current along the nerve from centre to periphery. He is right when he says that phantasms and visions are not to be confounded with mere ideas; but when he says that they are seated "in the senses," and that the idea in the sensorium excites the active state of particles in the retina, it would be clearer to substitute the expression that the idea in the cerebral hemispheres excites the action of the sensorium and the central terminations of the sensory nerves, so as to produce the same effect as if excited from a peripheral impression.

With regard to a question sometimes asked—are the subjective sensorial phenomena or sensations which arise from an internal stimulus like an emotion, as real as those excited by an external object?—it is obvious that as sensation, and the consciousness of an impression made upon the nerves, are the same thing, and as this function is seated in the sensory ganglia, and not the periphery of the nerve, it is as truly a sensation, whether the sensorium is reached from within or from without; whether acted upon from above or below. The individual who thinks he sees an object, which is not present to excite the optic nerve, ought to be told—not that he is wrong in saying he is conscious of the sensation experienced, but in supposing that that sensation consists of the consciousness of an impression produced upon the peripheral termination of the nerve by an external object.

vivified; and it appears, indeed, somewhat probable, from the well-known fact that those parts of the nervous system which have been used to be associated in their action, are ever ready to sympathise; and thus, when a certain part of the brain immediately concerned in the recalled impression is, from some cause or other, excited, and which, from its connection, had often been excited at the same time with a spot on the retina, the latter becomes likewise affected. But though we admit the probability of such consenting action, what has been already said is, I trust, sufficient to show that the reproduction of the sensation takes place independently" (xxvi, p. 244).

In the majority of cases of false sensations of mental origin, expectant attention appears to be the chief element in the causation, and we have had occasion to refer to several interesting cases in a previous section. In some, however, although a state of expectancy is also present, Fear itself has generated this expectant condition, and in illustration of this the two following cases may be mentioned. The first has reference to the sense of smell:

When, during the reign of Charles I, the Parliament was at issue with the King, and there were rumours of dangerous plots, report was made to the House of one (without foundation) which was designed to blow up the members. During its reading, some stood up alarmed, including "two very corpulent members," whose weight broke a board in the gallery, which gave so great a crack, that some thought there was a plot indeed, and Sir John Ray cried out that he *smelt* gunpowder. The result was a panic in the House, and throughout London, followed by an armed band marching to Westminster to defend the House from this imaginary gunpowder plot!

The effect of alarm and imagination in health upon the sense of sight, as well as upon feeling, is exceedingly well illustrated by the following account given by Mr. Braid:

"Two captains of merchant vessels arrived in port at the same time, and both went to take up their quarters in their usual lodgings. They were informed by the landlady of the house, however, that she was very sorry that she could not accommodate them on that occasion, as the only bedroom which she could have appropriated for their use was occupied by the corpse of a gentleman just deceased. Being most anxious to remain in their accustomed lodgings, almost on any terms, rather than go elsewhere, they offered to sleep in the room wherein the dead body was laid out. To this the landlady readily gave her assent, considering it better, so far as *she* was concerned, to have three such customers in her room than only one, and he a dead one. Having repaired to bed, one of the gentlemen, who was a very great wag, began a conversation with the other by asking him whether he had ever before slept in a room with a corpse in it, to which he replied "No." "Then," said the other, "are you aware of the remarkable circumstance that always, in such cases,

after midnight, the room gets filled with canaries, which fly about and sing in the most beautiful manner?" His companion expressed his surprise at this. But no sooner said than realised; for, the candle having been put out, presently there was a burst of music, as if the room really was full of canaries, which were not only *heard*, but at length the horrified novice in the chamber of death avowed that he both *saw* and *felt* the birds flying in all directions and plunging against him. In a short time he became so excited, that, without taking time to do his toilet, he rushed down stairs in his nightdress, assuring the astonished household of the fact, and insisting that the room really was *quite full of birds*, as he could testify from the evidence of his senses, for he had not only *heard* them, but also *seen* and *felt* them *flapping their wings against him*" (xx, p. 88). The captain had some excuse for saying he *heard* them, although not for seeing or feeling them, for his companion had really imitated the note of the canary by blowing through a reed dipped in water.

In concluding this chapter, we may briefly state the principles which lie at the foundation of the influence of the Emotions upon sensation, exciting, as stated at the commencement, ordinary sensations, excessive and morbid sensations, or suspending them altogether.

1. Thought strongly directed to any part tends to increase its vascularity, and consequently its sensibility. Associated with a powerful emotion, these effects are more strikingly shown. And, when not directed to any special part, an excited emotional condition induces a general sensitiveness to impressions—an intolerance of noise, for example, or cutaneous irritation.

2. Thought strongly directed away from any part, especially when this is occasioned by Emotion, lessens its sensibility. As the activity of the cerebral functions during deep intellectual operations, excludes consciousness of the impressions made upon the sensory nerves generally, so an absorbing emotion effectually produces the same result.

3. The emotions may cause sensations, either by directly exciting the sensory ganglia and the central extremities of the nerves of sensation, or by inducing vascular changes in a certain

part of the body, which excite the sensitive nerves at their peripheral terminations.

4. There is no sensation, whether general or special, excited by agents acting upon the body from without, which cannot be excited also from within by emotional states affecting the sensory ganglia; such sensation being referred by the mind to the point at which the nerve terminates in the body.

CHAPTER VIII.

INFLUENCE OF THE EMOTIONS UPON THE VOLUNTARY MUSCLES.

The Emotions, by their action on the nervo-muscular system, may cause—

I. Regular contraction and relaxation: Movements.
II. Irregular and excessive contraction: Spasms and Convulsions.
III. Loss of power: Paralysis.

SECTION I.—Muscular Contraction and Relaxation.

The ordinary influence of Emotion upon the muscles is most marked upon those of the face—"the Dyall of the Affections"—and as we shall find it convenient to include the muscles engaged in Respiration in the consideration of the action of the emotions on the voluntary muscles, it must be added that they are strikingly influenced by emotional changes; less, but sufficiently distinctive, is the effect produced upon the limbs, especially the hand. The question—to what extent the influence of the mind on the facial muscles is direct or through the heart and lungs, will be referred to subsequently. As Expression depends mainly on the contraction and relaxation of the muscles, the relation between Emotion and muscle becomes of great interest and importance in a physiognomical point of view, including in this all the fleeting expressions, gestures, and attitudes to which the passions of the soul subject the body. The predominance of one emotion, or of emotions of one class, may cause, however, more than evanescent expressions,—may determine the settled character of the features, and is the basis

of physiognomy as distinguished from mere pathognomy—emotions of a noble and lofty character tending to produce a refined, and those of a sensual character, a debased type of expression, which may become not only permanent in the individual, but hereditary.

As Scott describes Bertram's features in 'Rokeby:'—

> "For evil passions cherish'd long
> Had plough'd them with impressions strong."

On the contrary, as Ruskin says, "there is not any virtue, the exercise of which even momentarily, will not impress a new fairness upon the features, neither on them only, but the whole body."

Let us consider now the most striking and familiar effects of strong emotion upon muscular contraction and relaxation.

Joy excites the whole muscular system, producing, when excessive, laughter, rapid motions of the limbs, dancing, running, leaping, and throwing the arms about. When moderate, the mouth relaxes into a smile, involving with it the smile of the eyes. The broad grin of Joy contrasts with that of Hate. The effects of Joy, as contrasted with those of Grief, were well exhibited in the Barnsley Colliery Explosion of 1866, when, after a period of suspense, two men reached the top in safety—one of them having volunteered to seek for any that were still living, and succeeded in bringing the other in safety. "They were nearly pulled to pieces by the delighted engineers, who seized them, shook hands with them, stripped them, scrubbed them, and congratulated them till they were almost overdone."

The signs of Joy may closely border upon those of Fear, because the mind pictures to itself the possible removal of the sources of its joy—

> "Vix sum apud me, ita animus commotus est metu
> Spe, gaudio, mirando hoc tanto, tam repentino bono."

Here Terence recognises the psychological fact that Fear and Joy are simultaneously caused by glad tidings.

The nostrils are dilated, the angle of the mouth, the eyelids, and the eyebrows are raised by pleasurable, and depressed by painful feelings. The activity of the vocal muscles is excited

by Joy, giving a characteristic tone to the voice, but it may be too rapid to allow of intelligible articulation, which is still further embarrassed by increased frequency, rapidity, and swallowing:

> "*With hurried voice* and eager look,
> 'Fear not,' he said, 'my Isabel!
> What said I—Edith!—all is well—
> Nay, fear not—I will well provide
> The safety of my lovely bride—
> My bride?' *but there the accents clung*
> *In tremor to his faltering tongue.*"
>
> 'LORD OF THE ISLES,' CANTO II, XIX.

The muscles directly engaged in respiration are excited, and indirectly induce changes which more properly belong to the organic functions.

Grief, on the other hand, induces feeble respiratory movements—sighing, sobbing, groaning—and, on all the muscles, produces very different effects from Joy. They are, in fact, the natural result of pain which has been felt to such a degree as to exhaust the system; the muscles now droop under their own weight, those of the cheek, especially, tending to produce by their action on the eyelids the familiar expression of sadness. In the early stage of Grief, acute pain induces wringing the hands, grinding the teeth, tearing the hair. Its influence on the power of speech, when extreme, is well described by Capulet in 'Romeo and Juliet'—

> "Death, that hath ta'en her hence to make me wail,
> Ties up my tongue, and will not let me speak."

Yet not less true is the description of hopelessness, in its chronic form, by Collins in his Ode to the Passions.

> "With woful measures, wan Despair,
> Low sullen sounds, his grief beguil'd;
> A solemn, strange, and mingled air,
> 'Twas sad by fits, by starts 'twas wild."

While Hope:—

> "———— with eyes so fair:
> Enchanted smil'd, and wav'd her golden hair."

Contrast the mild facial expression and crouching attitude of Humility with the firm and decisive tread of Pride, the head erect or thrown back, the mouth firm and compressed, or

displaying a characteristic smile—"Pride smiling stern," as Beattie expresses it.

> "The lip of Pride, the eye of flame,
> The full drawn lip that upward curl'd,
> The eye that seem'd to scorn the world."
>
> 'ROKEBY,' CANTO I, viii.

"The attitude of the proud courser magnificently caparisoned, or of the cock that has just vanquished his enemy, coincides with the attitude of the proud man, so far as the relation of the form of these animals to that of man permits it. In each case the head is high, the movement grave and measured" (Gall).

With this, Gall contrasts the expression of Vanity:—"Observe in his cage either a canary bird or a goldfinch; while you address him in a kind tone, you will see him turn from side to side, and answer you in affectionate accents expressive of his pleasure." "One of my bitches is never happier than when she is carrying my slippers in her mouth. Charmed with this honorable burden she bridles up, and wriggles her whole body, and the more I exclaim 'Fine Stella, fine Stella!' the more animated are her movements, and she passes from one to another, to obtain a tribute of admiration. She might have been likened to a country damsel in a new gown on her way to church, wriggling to and fro, with head up, neck stiff, and chest protruded, to draw upon herself the envious looks of her companions. This same bitch, that had always been very lively and fawning, became suddenly afflicted with a sullen sadness, and in spite of all I could do to enliven her, she continued lying in her corner. After two years of melancholy she suddenly resumed her former gaiety, and began to caress me with her ordinary liveliness and affection. In the course of the same day I learned that a squirrel, which I had had in the house for two years, had been killed. Never was unquiet, vain, and jealous courtier, more deeply wounded than was this poor brute by the presence of a strange animal" (xxii, IV, p. 190, V, p. 282).

Pride is considered by Ruskin to be more destructive of the ideal character of the countenance and body than Fear, Cruelty, or Sensuality.

The shrug of the shoulder is a familiar and striking mark of Contempt.

The attitude of the vain man is the opposite of that of Pride, although both are founded in selfish feeling. "L'orgueilleux," observes Descuret, "s'élève; le vaniteux s'étale."

The aspect of the envious man is well described by the same author. "When misfortune happens to his rival, there is an infernal smile upon his thin lips; if fortune is his lot, his features immediately contract, his eyebrows meet, his eyes become sunk in their sockets, his figure already meagre seems to become stunted; in short, the envious man grows thin with the good fortune of another. If he hear read any production of remarkable merit, he is silent, but while fancying that he conceals, he betrays himself nearly always to an acute observer by a slight clattering of the feet, as if he wished in some sort to avenge his vexation on the ground" (lxvi, p. 599).

It is from the same motive that men bite their lips with jealous vexation.

> "But gnawing Gealosy, out of their sight,
> Sitting alone, his bitter lips did bight."
>
> THE FAERIE QUEENE.

The attitude of the muscles in Courage, firm and resisting, and prepared for defence, with a bold facial expression, contrasts with the well-recognised outward signs of Fear.

Fear amounting to terror, by causing spasmodic respiration, may, as in grief, choke the utterance; the facial expression is that of dyspnœa. In describing painful respiration, Gratiolet observes—"Ces mouvements ont pour cause immédiate les contractions de ce muscle peaussier du cou, dont la partie faciale a reçu de l'anatomiste Santorini le nom de muscle rieur, *risorius*, sans doute par antiphrase, car ce prétendu risorius est le muscle de la dyspnée mortelle, de l'angoisse et de l'épouvante."

In the accounts of the frightful colliery explosion at Barnsley in 1866, the effects of fear and suspense are well portrayed. The cage was lowered into the pit in the hope of rescuing some of the sufferers. Then two men lay with their heads over the edge of the pit mouth, the spectators standing around and maintaining the most profound silence, life or death hanging on the result of the experiment. The *stillness of death* was preserved by the awe-struck occupants of the platform, as

they *checked their breath* under the influence of their highly-wrought feelings. Then the two men gave a loud shout, which was heard echoing and re-echoing within the shaft. All listened *in sickening suspense* for a response, but none came, and the shout was repeated with a like result. In 'Childe Harold' is well expressed the signs of this condition of mind—

> "All heaven and earth are still, though not in sleep,
> But *breathless* as we grow, when feeling most,
> And *silent* as we stand in thoughts too deep:—"

Fear, if it does not proceed so far in the direction of terror as to paralyse the muscles, induces rapid muscular action in the form of flight, while it fixes and contracts other parts of the body in the instinctive attempt to conceal and, as it were, diminish their size. The man flying from pursuit, with his head bent between his shoulders, has been justly compared to a dog with its tail between its legs, under similar circumstances. By acting chiefly on the flexor muscles, fear causes the general bending or curving of the frame—analogous to the action of the hedgehog, &c.—while courage contracts the extensors, and produces expansion and height.

"To have," says Mr. Spencer (x, I, p. 483), "in a slight degree such psychical states as accompany the reception of wounds, and are experienced during flight, is to be in a state of what we call Fear. . . . Fear when strong expresses itself in cries, in efforts to escape, in palpitations, in tremblings, and these are just the manifestations that go along with an actual suffering of the evil feared."

> "He answered nought at all; but adding new
> Feare to his amazement, staring wyde
> With stony eyes and hartlesse hollow hew,
> Astonisht stood, as one that had aspyde
> Infernall furies with their chaines untyde.
> Him yett againe, and yett againe, bespake
> The gentle knight; who nought to him replyde;
> But trembling every joynt, did inly quake,
> And foltring tongue at last these words seemed forth to shake."
>
> THE FAERIE QUEENE.

The opposite muscular states of contraction or tension and relaxation alike find illustration in the emotion of Terror, for

with the signs of the former already mentioned, and "the stare of the eye," are combined the relaxation of the masseters, the sphincters, and the processes of organic life with which we are not now concerned.*

Beattie has accurately described the muscular action and appearance of the eyes in one form of fear—Suspicion:

> "Suspicion hides her head,
> Nor dares th' obliquely gleaming eye-ball raise."

The influence of the conflicting mental conditions of defiance, if not courage, and of fear, was well represented recently at the execution of Hinson, at Newgate. I abbreviate the description given by the 'Daily Telegraph:'—"A tall, muscular, and somewhat defiant-looking man, *advanced with quick, firm tread* up the steps of the scaffold. He was determined to meet his fate, if possible, unflinchingly. He exclaimed, 'Now for the grand secret!' and when he reached the drop he looked with assumed nonchalance on the iron chain depending from the cross-beam above him, and then down at his feet, with which he appeared almost to stamp upon the drop. His whole aspect for a moment was that of a man who held in supreme contempt the fall that was before him, and was as ready to die as he would have been to live, had the opportunity of a renewed period of existence been afforded him. But as Calcraft, who had followed the culprit to the drop, proceeding with his hideous preparations, drew the white cap over the condemned man's face, every particle of courage seemed to forsake him; his *whole frame quivered with fear* as the noose was adjusted round his neck; and the chaplain, speaking the last words of spiritual exhortation, left him to meet his doom. Some resistance on the part of the culprit had been anticipated, and from his demeanour when he first left the room where he was pinioned, probably not without reason. But, as previously stated, his whole bearing was altered in a moment when the full reality of his awful position was realised, and if the services of the two warders who stood behind him had been required, it would have been to support, and not to control him."

* See a good description of the physical aspect of Terror and of other emotions in Bain's 'Emotions and the Will.'

Calmness—a placid condition of the feelings generally—is marked by a gentle contraction of the muscles, indicative of repose, but at the same time of latent power—by a countenance free from furrows, but not relaxed into weakness.

Anger or rage contracts the masseters, inflates the nostrils, furrows the forehead, and exposes and rolls the eyeballs, clenches the fist, and induces a violent action and more or less rigidity of the muscles generally; it usually impels the body forward, while Fear impels it backward.

"The destructive passion is shown," observes Spencer, "in a general tension of the muscular system, in gnashing of teeth and protrusion of the claws, in dilated eyes and nostrils, in growls; and these are weak forms of the actions that accompany the killing of prey. Everyone can testify that the psychical state called Anger consists of mental representations of the actions and impressions which would occur while inflicting some kind of pain" (op. cit. p. 483).

The description of Earl Doorm, who "took his russet beard between his teeth" in his anger, admirably represents the symbolic acts of this passion, as well as the accompanying rapid movements:—

> "At this he turned all red, and paced his hall;
> Now gnaw'd his under, now his upper lip."

Ethwald, when enraged, is forcibly described by Joanna Baillie as "grinding his horrid jaws."

Love and Hate present their opposite characteristics no less clearly; the general effect of the former on the body being to possess, retain, and embrace the object upon which it expends itself; the attitude of the mother pressing the child to her breast being in unison with the leading feeling. The smile of Hate may be opposed to that of Love, for we may witness, especially when a person thinks he is able to succeed in a nefarious scheme,

> "The ghastly smile of fell Malignity."

Contrast again the expression of Adoration, a compound of love, wonder, and fear, with that of Revenge; taking, on the one hand, the exquisite description of Una—

> "With folded hands, and knees full lowly bent,
> All night she watcht."

Or Wordsworth's lines:

"Quiet as a nun,
Breathless with adoration."

And on the other, Collins's stanza:

"——— but, with a frown,
Revenge impatient rose:
He threw his blood-stain'd sword in thunder down,
And, with a withering look,
The war-denouncing trumpet took,
And blew a blast so loud and dread,
Were ne'er prophetic sounds so full of woe;
And ever and anon he beat
The doubling drum with furious heat.
And though sometimes, each dreary pause between,
Dejected Pity at his side
Her soul-subduing voice applied,
Yet still he kept his wild unalter'd mien,
While each strain'd ball of sight seem'd bursting from his head."

From these examples, it is sufficiently clear that certain feelings of the mind act upon certain muscles of the body in preference to others. Taking those of the eyebrow alone, it is not an affair of chance that one state of mind induces contraction of the orbicularis palpebrarum and the pyramidalis nasi, and thereby a lowering expression; another (joy and inquisitiveness) contraction of the frontal muscle, and consequently an arched eye brow; and a third (agony or painful thinking) contraction of the corrugator supercilii.* The fixed relationship between certain muscles and certain mental states is also proved, conversely, by the effects produced in evoking the latter, by placing the former in particular attitudes. This can be done to some extent in an ordinary condition of the system, but can only be thoroughly effected in artificial somnambulism or Braidism.

We have referred to the significant character of the movements of the hand. A very remarkable writer of the 17th century, John Bulwer, was the author of a book entitled 'Chirologia; or, the Natural Language of the Hand! Composed of the Speaking Motions and Discoursing Gestures thereof,' &c., the motto being "*Manus membrum hominis loquacissimum.*" In it he observes that this member, which he quaintly terms "the

* See these various expressions illustrated in the plates of Bell's 'Anatomy of Expression.'

manuall Text of utterance," takes "oftentimes the thoughts from the forestalled tongue, making a more quick dispatch by gesture; so when the fancy hath over wrought upon the Hand, our conceptions are display'd and utter'd in the very movement of a thought. For the gesture of the hand many times gives a hint of our intention, and speaks out a good part of our meaning, before our words, which accompany or follow it, can put themselves into a vocal posture to be understood. And as in the report of a Piece, the eye being the nimbler sense discernes the discharge before any intelligence by conduct of the vocall wave arrive at the Eare, although the flash and report are twins born at the instant of the Pieces going off, so although Speech and Gesture are conceived together in the minde, yet the Hand first appearing in the delivery, anticipates the tongue, in so much as many times the tongue, perceiving herself forestall'd, spares itself a labour, to prevent a needless tautologie." The remarks on gestures in general are admirable. "The lineaments of the body doe disclose the disposition and inclination of the minde in generall; but the motions doe not only so, but doe further disclose the present humour and state of the minde and will, for as the tongue speaketh to the eare, so *Gesture* speaketh to the eye, and therefore a number of such persons whose eyes doe dwell upon the faces and fashions of men, do well know the advantage of this observation, as being most part of their ability; neither can it bee denied but that it is a great discoverer of dissimulation and great direction of businesse. For, after one manner almost we clappe our hands in joy, wring them in sorrow, advance them in prayer and admiration; shake our head in disdaine, wrinkle our forehead in dislike, crispe our nose in anger, blush in shame, and so for the most part of the most subtile motions."

Bulwer, in his work, 'Philocophus; or, the Deafe and Dumbe Man's Friend,' unfolds "the subtile art which may enable one with an observant *Eie*, to *heare* what any man speaks by the movement of his lips," and designates Gesture the *Vox Corporis*—the only speech and general language of Human Nature. "What though," he says, "you cannot expresse your mindes in those verball contrivances of man's invention; yet you want not speech, who have your *whole body* for a Tongue,

having a language more naturall and significant, which is common to you with us, to wit, Gesture, the general and universall language of Humane Nature, which, when we would have our speech to have life and efficacy, wee joyne in commission with our wordes, and when wee would speak with most state and gravity, we renounce wordes and use *Nods* and other naturall signes alone."

We may undoubtedly grant to Bulwer what, he says, is all he asks to be allowed—"to have been the first that by Art endeavoured to link the Muscles and the Affections together in a new Patho-myogamia; or at least to have published the Banes between *Myologus* and *Pathology*, that any Physiologicall Handfaster that can marry them stronger together might doe it if he pleas'd" (ix, IX, p. 296—307).

Taking a general view of the opposite conditions of the muscles—contraction and relaxation—it may be observed that the absence of all painful and pleasurable emotions—a state of apathy—may be accompanied by motionless features and relaxed limbs; but perhaps the simplest and most satisfactory illustration of Emotion producing relaxation of the voluntary muscles is found in moderately pleasurable states of the mind. The whole body is in a languid and relaxed condition, and naturally assumes the recumbent posture; the eyelids droop, and the lips slightly open. If the emotion intensifies into active Joy, smiling and laughter succeed, in which the fibres of the orbicularis oris are relaxed. We have, however, no longer simple relaxation, but decided contraction also, the antagonistic muscles of the orbicularis—the zygomatici—being called into active exercise. Relaxation, again, we have seen exemplified in the later stages of Grief, in which it results from the exhaustion of pain and despair. In weeping, in which there appears to be a relaxation of the muscular fibres surrounding and controlling the mouth, the effort is really due to the powerful contraction of the muscles of the cheek, and especially of the triangularis oris.

Contraction, it has been said, is the natural language of the painful emotions, relaxation of the pleasurable ones, and it is true that in the early stage of Grief we witness violent contractions of some of the muscles. In Anger, again, the muscles

are vigorously contracted ; but there are many exceptions to the rule as thus laid down. It would be more correct to say that the pleasurable or joyous emotions impart *expansion* to the *expression ;* the painful or sorrowful ones, *concentration.* Some confusion has arisen from the use of the word " contraction " as applied sometimes to the muscles, and sometimes to the expression. Joy, Hope, Benevolence, contract the muscles ; so do Grief, Fear, Avarice ; but the former mainly contract the extensors, and the latter the flexors, and the result in the first case is expansion. However, we shall subsequently see more clearly how far, and in what sense it is true that there exists a relation between contraction and painful emotion on the one hand, and relaxation and pleasurable emotion on the other.

What principle determines these outward manifestations ?

We must commence with the recognition of the fundamental principle which governs purely corporeal actions, before we can trace the guiding principle of emotional movements. This is the *Lex Nostri conservatio* of Prochaska, so prominently brought into notice as a grand teleological law by Professor Laycock. By virtue of it, in unconscious states, certain movements take place to ensure the preservation of the individual. In conscious states the working of this law is mainly secured by feeling—by the sensations of pleasure and pain.

Now, the emotional movements are themselves guided by the same principle, and employ the same machinery when outwardly expressed.

Some of these movements, however, are obviously directly designed to secure, in accordance with the law of conservation, the object suggested by a certain emotion, while others have no such direct object, but occur by virtue of a law of correspondence, to which we are about to refer. The former may be called primary ; the latter, secondary or figurative.

Dr. Chalmers has taken the anger which prompts to the resistance of aggression as a proof of the hand of a contriver in the moral constitution of man, because of its obvious utility ; as much an evidence of design as the horns or other defensive weapons of an animal. The look and the words of angry violence, even when no action is performed, cause Fear. " We are so constituted that we tremble before the frown of an offended

countenance, the rebuke of an indignant eye, or an indignant voice, and perhaps as readily as we would under the menace of an uplifted arm."

Under the influence of Fear, or a sense of danger, certain muscular movements, securing flight or defence, occur, the obvious design of which we at once recognise. They may or may not be combined with the Will. But there are a number of movements not of this primary character, those especially understood as acts of expression, which are not, in the same sense, immediately designed to protect the individual, but are useful as outward signs of the emotion. These muscular changes appear to be based, as we shall show, on those performed for the service of the bodily organs, and especially those which minister to sensation. They are in some instances, as in the action of Grief on the lachrymal gland, safety valves—mainly outlets of emotional excitement—though not the less useful as constituting a part of the natural language of the emotions.

Gall, who, whatever may be the ultimate fate of the details of his Organology, was an original observer, a true philosopher, and infinitely superior to most of his critics, made an honest and bold endeavour to account for the character of the movements accompanying the different emotions; and his descriptions of their natural language, independently of his mode of explaining them, have rarely been surpassed. In some of the best-marked examples the pose and movements of the head are in accordance with the alleged position of the cerebral organs, but this, granting the correspondence, would only explain a part of the movements of the muscles of the face and body; and further, there are emotions characterised by marked outward signs, none of which appear to receive any explanation from their supposed seat in the brain. Thus, the movements of Anger do not seem to be clearly explained by the situation of Destructiveness above the ear, although Gall attributes to this the fact that "the head is drawn between the shoulders, and is carried neither forward nor backward, but makes a rapid movement, or rather it turns rapidly from left to right, and from right to left." With regard also to the action of the teeth, &c., in Anger, such movements seem much more easily explained on the principle that the muscles prefigure the form which they

would assume in the corporeal acts of eating, &c., and which we witness in carnivorous animals when, under the influence of rage, they tear their prey. The pantomime in man is in such instances a figure of the real and completed act in animals. "Why," asks Gall, "does the humble man walk meekly along, with his eyes fixed on the ground, while the proud one struts with expanded chest, and head erect?" And his answer is that, as "the organ of Pride has its seat in the median line, in the superior posterior part of the head; during its energetic action it elevates the head and carries it a little backward;" while, as Humility is the reverse state, the head and body are bent forward. "It can only be explained by the absolute inaction and the complete apathy of the organ of Pride" (xxii, V, p. 282). This example, is perhaps, the strongest that can be adduced in favour of Gall's position. It does not, however, help to explain many of the gestures which we observe in Pride, and which we refer to another principle. Again, as regards the elevation of the head, while it may be that one principle explains this and another principle another gesture, might it not also be accounted for by the corresponding attitude assumed when a person on a height has literally to look down from it upon one who is below him; or when a giant regards a dwarf? Hence a proud man is said to be "high," and he is apt to utter tall talk. In the opposite state of Humility, may not the position of the head be explained by a reference to the counterpart form assumed in bodily debility?

In that fascinating book, 'The Anatomy and Philosophy of Expression, as connected with the Fine Arts,' Sir Charles Bell divided the cerebro-spinal nerves into two great classes: the first, or original, comprising those of the Cord, and the Fifth Cerebral Nerve, possessed in common by man and the lower animals; the second, the far-famed "Respiratory" or "Superadded" class, introduced to adapt the organ of breathing to man's intellectual nature, arising from the medulla oblongata and supplying the head, neck, throat, and chest, which thus form "a mechanism for Respiration not found in the lower animals, but gradually introduced by a slow process of development into the animal kingdom, in order that, besides oxygenating the blood, it may be, in Man, the organ of Voice and Expres-

sion." This class of nerves it is which is mainly affected by the emotions; in fact, their office, according to Bell, is to communicate our feelings, "not in the language of sounds merely, but in the language of Expression in the countenance also." But the action of the mind on the heart is anterior to that on the lungs. Thus, he says, "Certain strong feelings produce a disturbed condition of the heart; and through that corporeal influence, *directly* from the heart, *indirectly* from the mind, the extensive apparatus constituting the organ of breathing is put in motion, and gives us the outward signs which we call Expression" (pp. 87, 92, 267).

That the emotions act upon the muscles concerned in expression, through their primary influence upon the heart and respiration, as insisted upon by Sir Charles Bell, can only be admitted up to a certain point, and unless qualified and supplemented, serves to explain the *modus operandi* of only some of the expressions occasioned by emotional excitement.*

"There is," he observes, in his graphic description of the effects of Terror on man, "a spasm on his breast—he cannot breathe freely; the chest is elevated; the muscles of his neck and shoulders are in action; his breathing is short and rapid; there is a gasping and a convulsive motion of his lips, a tremor on his hollow cheek, a gulping and catching of his throat; and why does his heart knock at his ribs, while yet there is no force of circulation?—for his lips and cheeks are ashy pale."

So in describing the overwhelming influence of Grief on woman, he speaks first of the nerveless and relaxed condition of the body—it reclines; the limbs gravitate. Then follow the signs connected with respiration. "Why comes at intervals the long-drawn sigh? Why are the neck and throat convulsed?

* Darwin, who in his introduction to his 'Descent of Man,' says that he had intended including in his work an essay on the expression of the various emotions of man and the lower animals, adds that his attention was called to the subject by Sir Charles Bell's book on the 'Anatomy of Expression,' in which he "maintains that man is endowed with certain muscles solely for the sake of expressing his emotions." On this Mr. Darwin observes, "As this view is obviously opposed to the belief that man is descended from some other form, it was necessary for me to consider it. I likewise wished to ascertain how far the emotions are expressed in the same manner by the different races of man." On these two questions, the mass of facts Mr. Darwin is likely to collect together will be of great interest.

What causes the swelling and quivering of the lips, and the deadly paleness of the face? or why is the hand so pale and earthly cold? and why, at intervals, as the agony returns, does the convulsion spread over the frame like a paroxysm of suffocation?" Bell's answer is that these outward signs of the passions in the face and elsewhere cannot proceed from the direct influence of the mind. "However strange it may seem to unaccustomed ears, it is to the heart and lungs, and all the extended instruments of breathing, that we are to trace these effects."

With the required modification of the exclusive theory laid down, the force and truth of these observations may be readily admitted. It is impossible not to see in the oppression of the breathing, and in the expression of the muscles of the face most concerned in respiration, the same effects produced by certain violent mental emotions, which are the result of morbid conditions of the heart and lungs without these mental changes. It seems clear, indeed, as we have said, that the encephalic centre of the emotions must be closely connected with the roots of the nerves supplying the lungs; so that, by a fixed physiological law, secured by connections—not mere contiguity—of nervous fibre, it is almost impossible for the former to be excited without increasing the action of the thoracic organs. But there would seem to be something more than all this—a certain fitness, discernible in many instances, at least, and probably present in all, between the emotion which agitates the muscles of even the mouth and nostrils, and the form which they assume, and which may be due to the action of another and more comprehensive principle.

Bell, I think, does not satisfactorily explain why of two equally powerful emotions, one induces a happy, the other a miserable expression of the features, although, in both instances, the heart beats loudly against the walls of the chest, and the breathing is equally accelerated. The palpitation of joy and fear, the breathlessness of delight and alarm, are accompanied by opposite facial expressions. Another principle is at work.

This principle rests first upon the fact that the functions of the bodily organs are assisted and guarded from injury by, and,

in short, are dependent upon, the action of the muscles. In regarding the action of the emotions, therefore, upon the muscles, it seems natural to trace their movements to their original use and signification in their immediate connection with the bodily organs, particularly those of special sense.*

The assistance rendered by the muscles to the bodily organs, and which is effected both by the will and automatically, may be illustrated by their action on the organs of sense. For example, in ordinary vision the facial muscles, including even those of the eyeball, may be passive, but the moment it is necessary to look intently at an object, they are employed to direct the organ of sight towards it, and to exclude impressions from other sources. In addition to the direct action of the muscles of the eye, those of the cheek are raised, and the eyebrows are depressed. More than this, there are accordant or sympathetic gestures of the body; but to this class of movements we shall refer under a distinct head. So, in more than ordinary smelling, the alæ nasi are dilated; and to escape a disagreeable odour, the nasal muscles conspire to exclude it. In listening, again, while the trunk is fixed, the neck is strained in order that the ear may approach nearer to the point whence the sound proceeds, and all the facial muscles assume a significant form, having relation to the organ of hearing. In tasting, the action of the lips assists in bringing the food in contact with the most sensitive portion of the tongue, and according as it is pleasant or nauseous, they assume different forms. With tasting are closely connected the acts of deglutition, mastication, and respiration, the muscular signs of which are familiar to all.

These muscular actions which are called forth by impressions from without, and so help to bring us into relation with the external world, are not, however, confined in their exercise to this directly sensational sphere, but are constantly employed *by the emotions*—and in intellectual operations, as we have seen—being then excited by impressions from within. These emotional movements may, as we have said, be called figurative. Thus, there exists a beautiful correspondence between the play of the muscles from the action of the senses, and from the action of the

* See foot-note at p. 57 of this work.

sentiments. Observe in Pride, understood in its coarser form, how much of the outward exhibition of its natural language is associated with the normal action of the muscles when employed in the exercise of bodily functions for wholly different purposes. The muscles connected with the eye no longer direct the attention to other men, or to surrounding objects, for it is exclusively directed to *self;* the nostrils dilate, not as respiratories, but, as it were, "to smell some ideal perfume; and the mouth performs the movements of pleasurable deglutition" (Gratiolet). Indeed, he tastes himself. Here, then, we have the muscles of the eye, the nose, and the mouth, as organs of sight, smelling, and taste, affected by non-sensational, or purely mental excitants. The mouth is also affected as an organ of respiration; there is a slight smile of satisfaction, but at the same time somewhat repellent. The expression of Sadness presents a striking contrast, for it is a state, in fact, of disgust, instead of one of infinite satisfaction, in tasting self. Instead of the saliva being swallowed, it is allowed to escape from the mouth, the tendency now being for the lips to open, and the gullet to close; moral disgust is marked by physical dis-gustation. Gratiolet asks—"Ne dit-on pas à chaque instant que la tristesse amène le dégoût de la vie?"

An enraged man mentally tears his foe in pieces. And is not this emotion clearly reflected in his voice? Sometimes the hated name of Tarquin was pronounced plainly by the maddened Collatinus—

"But through his teeth, *as if the name he tore.*"

The same principle applies to the actions or gestures of the whole body. Dislike and affection, mental pleasure and pain, occasion general muscular movements similar to those which arise from corresponding bodily states. If the mind repels a suggestion, the attitude assumes the form of resistance; if it hugs a pleasant thought, or embraces a beloved image, every action is in accordance therewith. This manifest action of the law is very noticeable in intellectual operations, and has already been referred to when we spoke of the influence of the Intellect on the muscles.

Thus, the mind acts figuratively through all the muscles of the body, the limbs, the trunk, and the face; but it so happens

that the great group of movements classed under the head of "Expression" are mainly those of respiration, and hence the muscles of respiration may be regarded from Sir Charles Bell's point of view as emphatically, though by no means exclusively, those of expression also. But the facial nerve, although employed in respiration, is also employed for movements connected with the external senses; and these sensorial movements are also excited by what may be regarded as analogous or corresponding mental states, and, moreover, some of these are effected by muscles not supplied by nerves included by Bell in his respiratory class. In short, while it is quite true that the emotions affect the respiration, while the lungs and heart are most truly organs of expression, and while the facial muscles are unquestionably affected in their character of respiratory muscles, by emotional excitement, they are also affected by this cause *as muscles of sense;* and all these movements, whether of the respiratory or the sensorial class, assume, in certain states of the emotions or feelings, the same forms as they would if subjected to corporeal impressions, affecting the respiration and the senses respectively. That we can always trace the correspondence, and say this mental expression represents and symbolises what would have occurred under such and such physical conditions is not affirmed, but that we very frequently can is certain, and that the same law pervades the whole class of emotional movements to which we refer, is extremely probable.

Reverting now to the observation previously made, that the outward signs of pleasurable and painful emotions cannot be easily indicated by any word uniformly descriptive of their presence—by "relaxation and contraction" of the muscles, or even by "expansion and concentration of the expression"—it must here be remarked that the influence of these feelings is all-important from the present point of view. Combined with the principle of figurative movements, which serves to explain why one set of muscles is called into action rather than another, it becomes true that the form assumed by the features under various emotions is determined by their character, whether painful or pleasurable, just as the muscles of sense are by the character of sensorial impressions. As all movements have for

their great end the preservation as well as the enjoyment of the individual, and as contraction and relaxation take place primarily to attain this end, a general expansiveness of expression and gesture is allied with all the emotions which are excited by impressions (or generated by ideas) of a beneficent character, while a general exclusiveness or contraction of the features is allied with emotions excited by maleficent impressions; the object of one class of movements being to court and receive, and of the other to avoid and reject.

As pleasurable vision causes one expression of the eye and its surrounding muscles, and painful vision another and opposite one of these parts, and so of all the other senses, respiration, deglutition, &c., so pleasurable and painful emotions, in affecting the muscles connected with this or that sense, will cause them to assume the form proper to their own sensibility.

Frequently an emotion excites all the sensorial and respiratory muscles; at other times the influence is distinctly partial and circumscribed, the muscles of one sense only being called into mental activity. In the original form of the features in their relation to the exercise of the sensorial and respiratory functions, we have traced the sentinel-action of the muscles subserving these functions, admitting or excluding impressions, according as they are beneficial or noxious, pleasurable or painful. If a stream of light is painful to the eye, all the muscles concerned unite in excluding it and protecting the sight; if agreeable and salutary, they combine to favour its entrance.

The parallelism on which we insist remains unaffected, whether we adopt the hypothesis of the sensationists or the conservationists. Indeed, it is admitted that the law of conservation is usually secured by, and is ever in accordance with, a system of pains and penalties. It may be by virtue of a primary conservative reflex law that we close our eyes to a strong light, but the pain we endure by continuing to gaze at it soon obliges us to do the same thing. In either case, or whichever explanation be given, the muscles connected with the organ of sight unite in protecting it and excluding the light; and analogous mental states induce the same changes. In fact, Professor Laycock, the most able and uncompromising advocate of the *Lex Nostri conservatio,* fully admits that in states of conscious-

ness, conservation is usually secured by feeling. Thus, after observing that as a feeling of pleasure or pain is very often associated with the action of the conservative machinery, the inference is unjustly drawn that feeling is the cause, he says, "Pain is the sentinel of the organism," which "ushers in or accompanies a series of vital changes, the end of which is the prevention of evil, or the restoration of health from illness." (lv, II, pp. 27, 35.)

Pleasurable and painful sensations from without determine, then, the form which the muscles called into action assume; the purpose being to protect the organs. Similar muscular changes arise from the emotions, according as they are pleasurable or painful, in consequence of the harmony between mental and bodily acts. The mind, figuratively speaking, sees, hears, smells, tastes, touches, and respires, and with each of these mental operations the feeling of pleasure or pain may be associated, and affect the muscles accordingly. The emotions may eagerly receive or forcibly reject the stimuli which excite them. In regard to the action of the respiratory muscles, it is necessary to supplement the excitement they undergo through the action of the emotions upon the heart and lungs as laid down by Bell, by the principle under consideration. The form which the muscles of the mouth assume (regarding it here as an organ of respiration) in laborious breathing, is designed to assist it, and when certain emotions arise, the same expression of these muscles presents itself. What before was a mechanical act in aid of respiration becomes the natural language of the breathings of the soul. The pleasurable emotion which causes a smile relaxes the mouth, inducing an expression which corresponds with that excited by the respiration of pure air. Joy accelerates the action of the heart and the circulation; the respiration is quickened, and the muscles of the mouth tell the tale, while laughter is effected by a convulsive form of respiration. On the other hand Fear takes away the breath, and produces on the facial muscles the character impressed by dyspnœa from pulmonary obstruction.

By way of summary, it may be said: We suffer pain of two kinds—bodily, as toothache; mental, as grief or anxiety; and when the latter occurs, the outward signs, allowing for local

differences, are strikingly similar to those which are exhibited in the former. Hence, when Joy and Fear respectively cause respiratory and cardiac excitement, the expression of the features is entirely different—the form assumed being determined by the corresponding bodily form excited by common and special sensation—the rough outline of general expression representing common sensation, and the delicately specific shades answering to the predominating special sense figuratively affected.

It cannot, in short, be too strongly insisted upon in connection with this subject, and particularly in reference to Sir Charles Bell's doctrine, that the same facial muscles perform different functions, and that therefore the so-called respiratory nerves supply muscles which are not used only in respiration. Take (*e.g.*) those connected with the mouth. They are not merely muscles of respiration—but also of taste, and prehension. So far as they are respiratory in character, they will be influenced by acts of respiration, and hence whatever emotion disturbs the action of the lungs may affect the muscles of the mouth. But mental states may act directly on the mouth in its other functions, and without exciting the action of either the heart or lungs.

The respiratory muscles, again, may be excited by an emotion, and two very different emotional states may to this extent have a common effect; but the particular form the facial muscles assume, may be completely modified by the figurative expression which the muscles assume in accordance with the character of the emotion—especially whether painful or pleasurable.

The *language* which we employ in reference to mental acts illustrates, in a remarkable manner, the figurative character of the movements referred to under this head. Thus, as a state of mental disgust may cause an expression of the mouth similar to what is seen in threatened vomiting, so we speak of *loathing* in regard to the objects contemplated by the mind. We loathe the idea of a certain act, as much as a certain nauseous drug. Dr. Chalmers, in one of his sermons, referring to some opinions from which he strongly dissented, exclaimed, "I *nauseate* them!" A lady who heard him informs me that the emphatic enunciation of the word, and the accompanying gesture, indicative of nausea, had a most striking effect. In the muscular changes originally associated with nausea and vomiting, there was an obviously

direct design and physical use, altogether apart from expression; but the corresponding changes induced by emotion are merely figurative, although they become serviceable as outward signs, the uniformity of these signs constituting their utility as a natural language. No savage expresses grief by laughter, however true it may be that some of the African tribes, as described by Sir Samuel Baker, make merry at the funerals of their relations. The obvious explanation of this seeming anomaly is that Grief is not felt, but Joy. An admirable popular illustration of the uniformity of natural language will be found in 'Greyson's Letters,' by Professor Rogers, in which the absurd effects of supposing a reversal of the fixed signs of grief are humorously described.

Illustrations of figurative language derived from figurative movements abound; but a few additional ones will be sufficient for our present purpose. A stifling smell induces muscular contractions in the nasal muscles calculated to avoid it; and a bad moral odour affecting the mind will cause a very similar expression. The corresponding language may be found in a line of 'King John,' where Shakespeare makes Salisbury say—

"For I am stifled with this smell of sin."

So again, as the motion of the lips and even deglutition, may indicate that the mind is tasting and relishing a certain pleasurable idea, we employ such language as "the mental palate," "a man of taste," and we speak of "disgusting" and "distasteful" in reference to purely psychical phenomena. Tact is the psychical analogue of touch.

The influence of the emotions on the original formation of words may sometimes be traced with tolerable clearness. If we wish to express contempt, we say, *Pooh!* Now, it is evident that this originates in the act of throwing out the lips, so as to reject something that is distasteful. What? An idea. The gesture is precisely the same as that which we employ in order to rid the mouth of a material substance with which we are disgusted, and is therefore figurative. In the same way we may trace the words *putidus, fetidus,* &c., to their roots *ptt* and *ftt,* which are the natural sounds produced by the labial movements indicative of disgust. There are also guttural sounds

expressive of still greater disgust, *arrrh* and *krrrh*, which appear to be the bases of words in various languages, as *cracher* in French.* Probably *ptt* is the root of our *s-pit*. The word *hiss* again is derived from the sound made in emotional states of hate and contempt. The sound is derived from the labial gesture, and the labial gesture is similar to, and figurative of the movement performed by the sudden jerking expiration employed in expulsion. We try to show our scorn by expelling a certain individual or idea from our thoughts. A reverse action is expressive of assent, and produces an inspiratory or suction sound; one, at least, very common in Cornwall.

As we have already observed, some movements are of a *sympathetic* character. In the use of the bodily organs, in addition to the action of the muscles directly required, other movements arise which are in unison with them. The whole body—the attitude and gestures—will thus sometimes display sympathy with the exercise of only one sense. "Whether one member suffer, all the members suffer with it; or one member be honoured, all the members rejoice with it." It must not, however, be forgotten that this sympathy may be as much shown by passive as by active forms, by respectful and considerate relaxation as by jubilant contraction.

It follows that when an emotion excites any of the muscles figuratively, the other muscles will be excited sympathetically, as they would have been by the original action of the bodily organs in what we have, for the sake of distinction, termed sensational movements. In this way the contraction or relaxation of many of the muscles, consequent on emotional excitement, may be explained.

SECTION II.—Irregular and Excessive Muscular Contraction: Spasms and Convulsions.

To some extent we have anticipated the consideration of the influence of Emotion on spasmodic action of the muscles, in de-

* Cf. Gratiolet, *op. cit.* p. 161. He traces to the various sounds made between the lips and the throat, frrr, trrr, rrrr, grrr, the words φρίξ, frigus, froid, frayeur; τρέμω, tremor, terreur; ῥῖγος, rigor, roideur, horreur; gronder. We may add our English words, fear, fright, terror, horror, roar, growl.

scribing the effects produced by powerful emotional states, as Terror, which often causes excessive or spasmodic contractions, sometimes amounting to tetanic rigidity. The sobbing of Grief, the laughter of Joy, afford daily examples of spasmodic muscular contraction from emotional stimulus. The spasm which chokes the voice and converts the fibres of the platysma myoides into rigid cords in Terror, the convulsion and tremors of the facial muscles in Despair, the clenched hands, the convulsive opening of the mouth and spasm of the diaphragm and muscles of the chest in Fear, the spasm of the jaws in Rage, the spasmodic rigidity of the muscles in a maniacal paroxysm—are they not written in the graphic pages of Bell? With the exception of mania, these spasmodic contractions are consistent with health. We shall include under the present section all convulsive attacks, whether epileptic or not, whether infantile, puerperal, or hysterical, trembling palsy, chorea, spasms of the larynx and pharynx, nervous hydrophobia, and tetanus. Physiologically, they may all be referred, when of emotional origin, to disturbance, more or less serious, of the functions of the sensori-motor apparatus, especially the medulla oblongata.

When the mind is affected by witnessing a frightful sight, or hearing dreadful news, the impression is conveyed—a certain molecular change occurs—along the nerves of special sense to the brain, and the emotion excited agitates, through the sensori-motor ganglia, the muscular system. If, on the other hand, a terrific image is formed in the mind, independently of stimuli from without, the muscles are aroused to more or less violent action by the idea exciting emotions which operate upon the sensory ganglia in the same way as when they are called into action by the nerves of special sense. How Emotion acts in inducing abnormal and excessive action of the muscles, whether it resembles the electric irritation of certain nervous centres which is succeeded by convulsions, and what are the vascular changes which take place, are more difficult questions, on which much difference of opinion still exists; but their determination does not affect the statement just made.

Epileptic Convulsions.—Although all the forms of spasm and convulsion have the one point in common—that of involuntary, irregular action, clonic or tonic, of the voluntary muscles—it

must not be forgotten that when Emotion occasions epilepsy, we have sooner or later something more—loss of consciousness. Whether this unconsciousness, or rather the cerebral condition it implies, causes the convulsions, may well be questioned and is refuted by Schr. v. d. Kolk, who considered that both are equally results of an antecedent affection (an exalted sensibility) of the medulla oblongata. "The starting-point," he says, "of the various convulsive movements in epilepsy must be sought in the medulla oblongata." He does not distinguish between epilepsy and other convulsive affections from this point of view, for he adds that the same is true of most other convulsive disorders, as eclampsia and chorea, in which commonly the muscles of the neck, head, and tongue are affected. "It is incorrect to suppose," again says this pathologist (lvii, p. 230), "that loss of consciousness always precedes the attack" in epilepsy. Marshall Hall's original statements in regard to epilepsy are in accordance with this position; for when speaking of Emotion as a cause of this disease, he observes that it seems to induce the seizures directly by acting immediately through the spinal cord—"the muscular system is excited psychically" (xvii, p. 27-8). It may be that generally the mental shock causing the attack so affects the supply of blood to the brain that unconsciousness is the result, while sometimes convulsions are produced without the vascular changes taking place which necessitate the loss of consciousness. That convulsions of a non-epileptic character may occur without this condition being present, no one disputes. There seems no sufficient reason, therefore, for connecting it as an essential cause with the convulsions of epilepsy, although the entire withdrawal of cerebral control may intensify the convulsions by liberating the sensori-motor ganglia, excited to abnormal action by certain stimuli. As ordinary movements called into action by the emotions imply normal vascularity and nutrition of these centres, it would seem natural that their irritation or undue excitement would cause excessive and irregular muscular action; while it is clear that the mere suspension of volition does not involve this, for in somnambulism the movements may be performed as perfectly as when awake, and syncope does not necessarily occasion convulsions. The start of fright is the simplest expression, both

of the conservative law already referred to (p. 157), and of the irregular muscular action tending to convulsion, occasioned by the suddenness of the impression—an impression which in this instance involves mental pain, similar to the pain of the eye caused by too strong a light, which likewise may be followed by automatic movements intended to be conservative, but also liable to pass on into convulsion. In either case, in a person predisposed to epilepsy, the latent tendency might be aroused. Dr. Todd, Dr. Carpenter, and Van der Kolk, all employ the familiar illustration of the Leyden jar to describe the condition of the nervous tissue at the seat of the disease. Continual malnutrition causes disturbance of the polar state of some region of the encephalon. If it amounts to a certain intensity it is manifested in an epileptic fit, as the jar, "when charged with electricity to a certain state of tension, gets rid of the disturbance of equilibrium by the disruptive discharge." (Dr. Todd's 'Lumleian Lectures,' 1849, and viii, p. 876.) And the Dutch physician, after observing that we must, in inquiring into the proximate causes of convulsive movements, take the ganglionic cells as the parts from which all action proceeds through the nerves as conductors to the muscles, compares these cells to galvanic or electric batteries, which must be charged to a certain extent before the electricity accumulated in the Leyden jar has acquired sufficient tension to discharge the flask (lvii, p. 215). In this connection, it must be admitted that Dr. Radcliffe's arguments in favour of diminished nerve tension and cerebral anæmia deserve consideration, although they are not, I think, conclusive.

The experiments of Kussmaul and Tenner on animals, made with a view to determine the cause of convulsions, bear upon the question of vascularity. They are so well known that it is only necessary here to recall the position in which they leave the question as to the nature of epileptic and eclamptic attacks —namely, that it is probable "that epileptic convulsions can be brought about by contraction of the blood-vessels induced by the vaso-motor nerves" (xlii, p. 101). It will be remembered that these experimenters laid bare, in rabbits, the ascending cervical branches of the sympathetic, and divided them at the inferior cervical part. One of the carotids was then tied, so

that the brain only received the supply of blood from the other, the nerve connected with which was Faradised, and the vaso-motor nerves were thus stimulated so as to contract the diameter of the cerebral vessels. Convulsions followed.* The observers admitted that these experiments by which convulsions were induced required confirmation, but subsequent observations would seem to bear out the conclusion that in epilepsy there is a state of anæmia as regards the general condition of the encephalon, in at least the early stage. Not that Kussmaul and Tenner held that a sudden interruption of nutrition of the brain is usually the *proximate* and real cause of epilepsy or eclampsia, but that it acts indirectly by producing certain molecular alterations of the brain substance. Van der Kolk, who differed from the opinion of Kussmaul and Tenner that anæmia is the condition of the encephalon and original cause of the attack, in epilepsy, regarded the post-mortem appearances presented by the medulla oblongata in cases of epilepsy as a proof of hyperæmia of that part. The use he makes of the above experiments is to draw the inference that the sympathetic, when galvanized, causes irritation of the medulla oblongata, and thereby convulsions. He did not, however, consider, as already intimated, that the vascular spasm is the cause of the fit, but "rather the result of the commencing discharge of the nerve-ganglia, which are certainly most closely connected with the vaso-motor nerves" (lvii, p. 229-30); that is to say, the excited action of the ganglionic cells in the medulla influences the cerebral circulation through the sympathetic, so as to cause loss of consciousness, while through the spinal cord it acts on the muscular system in producing convulsions. Violent terror causes convulsions, according to him, by reflex action of the medulla oblongata.

It is, perhaps, possible to reconcile the experiments of Kussmaul and Tenner with the pathological observations of Van der Kolk, either by supposing that hyperæmia of one portion of the encephalon coexists with anæmia of another, or by reading the appearances presented after death in Schr. v. d. Kolk's cases, as Dr. Radcliffe reads them—namely, as indicating, not hyperæmia, but anæmia of the medulla, and

* Dr. Brown-Séquard denies the epileptic character of these attacks.

its results, mal-nutrition and degeneration. In regard to the first alternative, there is a growing belief in the importance of distinct vascular centres or areas, and therefore the opinion that the medulla, excited by violent emotion to increased vascularity, may cause direct excitement of the roots of the nerves thence arising, including the alleged origin of the sympathetic, while there is anæmia of other regions of the encephalon, upon which the control of the will depends, would not be an unreasonable hypothesis. Mr. Moore, in his little book 'On Going to Sleep,' has pointed out that the carotid supplies the anterior and middle lobes of the hemispheres, the corpora striata and retina; while the medulla, optic thalami, meso-cephale, posterior lobes and cerebellum, are supplied by the vertebro-basilar. As respects the alternative, that the microscopical and other appearances of the medulla favour the interpretation of its anæmia as well as that of the cerebrum, it must be admitted to be a matter of no small difficulty to decide from the morbid appearances observed after death what was the condition of the vessels in a certain region during the time of the convulsions. The successive changes which may have occurred in the contraction and enlargement of vessels do not record their history on the nervous tissue. The temporary paralysis of the vaso-motor nerves and increased vascularity in fever, and the opposite condition indicated by the previous shivering, described by Bernard, are not to be found in the *post-mortem* examination. So it is very possible for different observers to arrive at different results in endeavouring to infer from the state of an organ after death what its condition as to vascularity was during life, and, moreover, during a particular period of life. Looking simply at the effect on the blood-vessels caused by a violent emotional shock, we know that pallor and other signs of anæmia are present; an argument certainly in favour of the position that when convulsions are caused by sudden and painful emotion, the encephalon is in a state of anæmia. Pallor alone would not prove this, it is true, and would only allow us to infer a pallid condition of the parts supplied from the same source; but when we examine the pulse, it is difficult not to draw the same conclusion as to other regions of

the encephalon. Fear, through the vagus or sympathetic, has checked the action of the heart; and it may be that in cases of epilepsy of emotional origin, the cerebral anæmia, consequent upon cardiac inaction, may be one, but certainly not the only, cause of the paroxysm. The vascular question appears to me still *sub judice*, and one feels disposed to say with Dr. Handfield Jones, "Spasm and its modifications seem to afford much ground for believing that the nervous centres *per se* may assume different morbid states. I cannot think that changes in the blood-flow can explain these manifold varieties of morbid action."

But as to blood theories, whether we adhere to the opinion of stimulation (by red blood) of the motor functions of the medulla, or regard the withdrawal of arterial blood (and an antagonising nerve power) as the true cause, we may speak of excessive emotion irritating the motor nerves at their origin, and inducing convulsive movements of the muscles they supply. In the former case, irritation is a result of active stimulation corresponding to the electric stimulus of the medulla, which is acknowledged to cause convulsions; and in the latter it is, as Dr. Radcliffe would say, but another name for inefficient innervation (xlvii, May 12th, 1860). And this irritation, the result of emotional shock, however we choose to explain it, involves the disturbance of the co-ordinating functions of the olivary bodies already referred to, which Clarke observes is "not limited to the medulla oblongata, but extends to the spinal cord and to the sympathetic, influencing the glandular secretions and the diameter of the capillary vessels through the vaso-motor nerves."*

But the foregoing surmises as to the pathology of convulsive seizures must not be allowed to divert our attention from the more obvious truths, that the emotions when sudden or excessive in character do, by their downward influence through the medulla oblongata, produce involuntary automatic

* 'Phil. Trans.,' 1868. In the same memoir, this admirable histologist also observes that these bodies are not the only motor centres through which the different movements are co-ordinated for expressing the passions and emotions, but those through which different movements are affected by sudden, violent, and peculiar impressions on the special senses.

movements, convulsive in character; that these emotions may be excited from without through the senses, or from within by ideas; and that the convulsive movements succeeding these emotions may be epileptic. Mal-nutrition of the nervous tissues may doubtless be induced by a prolonged emotional disturbance like grief, and then the first paroxysm may be induced by other than psychical stimuli—the impaired nutrition having probably been caused by the influence of a depressing emotion on the blood, and the particular disease, epilepsy, being determined by individual predisposition. If, as Romberg says, pain is the prayer of the sensory nerve for healthy blood, it may be said that the prayer of the motor nerve for healthy blood is convulsion.

The following case is especially interesting, because not only was it of emotional origin, but part of the treatment was locally directed to the region supposed to be more particularly connected with the disorder—the medulla oblongata and the cervical sympathetic—and appeared to serve as a useful adjuvant.

I abridge the report of the case given by Dr. Althaus in the 'Medical Times and Gazette,' April 24th, 1869.

Mary B—, æt. 16, one of fifteen children of the same mother. The mother says none of her other children have had fits, but that she had a succession of frights when *enceinte* with this child. The girl herself had her first fit after a fright, some other children having played at ghost with her in a cellar. This was when she was five years of age. Some years afterwards she had another fright, by a woman coming up to her while she was playing in the street, and swearing at her. Since this she has never been quite free from fits. The convulsive seizures are well marked, commencing with a scream; the head is turned to one side, there is foam at the mouth, the tongue is bitten, the urine often passes involuntarily. The convulsion lasts four or five minutes, during which there is complete loss of consciousness. After the fit the patient sleeps for half an hour, and then wakes with a bad headache, and speaks slowly and thickly for some time. There is no aura with these fits, which occur at intervals of two or three weeks. Sometimes she has a succession of five or six in the same day; at others only one or two at a time. The attacks of petit mal are much more frequent, as she has

sometimes thirty or forty such seizures in one day, and rarely goes three or four days without any. Four months' treatment with bromide of potassium relieved her of the convulsions, but the petit mal remained the same. A month after this, during which galvanism was applied to both mastoid processes and the cervical sympathetic twice a week, report is made, "much better in every respect. Since galvanism was commenced she has only on three occasions had fits of petit mal, and then only four or five where she had thirty before." November 12th.—"Has had altogether ten applications of galvanism. Had last attack of petit mal early in August. Last convulsive attack March 3rd Apparently well. Ceased attendance."

In another case, under the care of Dr. Althaus, the disorder was attributed by the patient to a great deal of trouble and anxiety, and was also preceded by a great fright when he was awakened by an alarm of the house being on fire.

When admitted into the Infirmary for Epilepsy and Paralysis he was 36, and had suffered for six years from irregular attacks of petit mal, the attacks being marked by severe pain at the back of the head, and a thrilling sensation going through him as if about to die. Sometimes it appears to him "as if a vapour rose on his brain and muddled him." This lasts only about a second, and he then quite loses his consciousness for about a minute. While in this condition he will perhaps scratch the plate with his knife, or tear up paper or his clothes, or pull a handkerchief over his head, or, if in the street, put mud on his clothes, &c. When he comes out of these attacks he feels very confused, and sees double for two or three minutes. Within an hour or two he has quite recovered himself. These fits happen two or three times a week, generally only one in a day, and but very rarely two or three at a time. From Nov. 27th, 1866, to April 2nd, he took sulphate of zinc, oil, and nitrate of silver, but, although the general health improved, the fits remained as frequent. Galvanization of both hemispheres and the medulla oblongata was then ordered twice a week. In the course of the next month he had only one fit, in which he tore his waistcoat, and the report of Oct. 15th says— "Has had altogether fifteen applications of galvanism and no fit during the last four months. Ceased attendance" (xlv, May 8th, 1869).

It would be interesting to know whether the improvement recorded in these cases was sustained.

Trousseau records the case of a man, æt. 36, who was under his care for epilepsy five years previously. He had been suddenly awakened and frightened in the night "by horrible shrieks from his wife, and a few days afterwards he had his first attack." He himself, it should be stated, referred the affection to the sudden cessation of chronic coryza, but Trousseau merely speaks of this as "a coincidence." It will be observed in this case that the patient experienced a sensation of trembling in the pit of the stomach. In another instance the patient's "attacks were ushered in by a sensation of great heat beginning at the navel."

"In the beginning, these seizures were characterised by a sensation of inward cold, of rigors, and, to use his own words, of trembling, seated sometimes in the arms, the legs, or thighs, and sometimes in the pit of the stomach, or various parts of the body. This sensation spread all over him, and lasted a few minutes, without being attended with loss of consciousness. The attacks recurred at irregular intervals, rarely longer than four or five days, and were brought on by the slightest painful emotion, the least variation of temperature, a draught of cold air, or exposure to a hot sun. . . . They were now regular convulsive seizures, similar to those he had on admission. On the day of his admission he had just lain down, when he suddenly got up, taking hold of the bar across his tester-bed, then, throwing his arms about, began to vociferate in the most atrocious manner. His face was of a purple-red colour, his looks haggard, his voice loud, and his articulation rapid. He looked exactly like a delirious maniac. The attack had set in with quivering of the legs, followed by convulsions. . . . He was perfectly unconscious of his acts, and kept insulting those who were attending him. This fit lasted about twenty minutes, and without any transition he became calm" (liv, I, p. 40).

It is not necessary to describe the symptoms more in detail. It is interesting, however, to observe the most prominent of them. Do the symptoms, it may be asked, vary in these cases which originate in emotional states from those which are occasioned by other causes? It might at first sight seem probable that epilepsy, unquestionably caused by a moral shock, would be

marked by different symptoms from those which usher in a seizure consequent upon certain other causes; and from this point of view it might seem reasonable to connect the sensations referred to the region of the solar plexus with the emotional origin of the attack. If it be established that epilepsy is a disorder specially connected with the medulla oblongata, and if Schiff and others are correct in their opinion that the sympathetic arises from this portion of the nervous system; and if, further, the emotions bear, as we have indicated, a remarkable relationship to this part, it might appear natural thus to explain the *rationale* of the symptoms of those patients who have described the epigastric sensation of heat or cold or spasm, as if from thence the seizure originated and was transmitted throughout the body. This argument, however, cannot be sustained, for no matter what the exciting cause may be, if the medulla is the seat of the disorder, the sympathetic would be equally liable to be affected, if, as there can be little doubt, it is very closely connected with it.

It is a remarkable circumstance that in some cases of emotional epilepsy, the same alarming event which in the first instance induced an attack was immediately brought vividly to mind, and was uppermost in the thoughts whenever an attack subsequently occurred, although occasioned by other circumstances. A case of this kind is related by Trousseau, who endorses the observation of Jules Falret, that "many persons who have become epileptics after strong moral emotions, or intense terror, see again in spirit or before their eyes, on each succeeding seizure, the painful circumstances or the dreadful scene which first produced their complaint." The case is as follows:—

A boy, æt. 11, lost his mother. The wound made so deep an impression upon him that he was seized with epileptic convulsions. He was 17 when he was placed under treatment at the hospital, and it was found that on the accession of every fit, which had been of frequent occurrence during the six years, this painful circumstance invariably recurred to his mind. "I am seized through my thoughts," he used to say, and he explained to his medical attendants that his thoughts were always the same, and had constant reference to his loss (liv, p. 71).

That many cases of convulsion, of an epileptic character, are

incorrectly referred to an emotional cause is no doubt true, but with a liberal allowance for the influence of other causes which may have been overlooked, it is impossible to deny the great importance of powerful emotion in the etiology of this affection. After observing that mental influences are far more frequent causes of epilepsy than injuries, Romberg states that, among forty-four cases, the causes of which were carefully examined by Cazauvieilh, he found that in thirty-one they were due to influences of this nature. He adds, that "no disease is so liable to be produced by Fright as this affection, which may itself be excited by the sight of an epileptic paroxysm; the next most frequent influence of this description being Fear, an agent that came into operation more often in former times, when tales of ghosts and hobgoblins were the bane of the nursery, than at present: Anger also comes under this category as an exciting cause. The simulation of epilepsy also operates as a mental influence, and is said, occasionally, to pass into the real disease (xxxiv, II, p. 213).

"The form of epilepsy arising from Fright," observes Marshall Hall, "is of the most intractable character" (xvii, p. 39). In 67 cases, of which the cause was traced by Leuret, it was found that in no less than 35 the first symptoms were preceded by fright. It is to be presumed that an observer like Leuret would satisfy himself that the interval between the attack and the fright was not so great as to render the circumstance merely accidental. Trousseau, who is disposed, I think, to underrate the frequency of this cause, admits that he has ascertained the fact of fright being a cause "on several occasions," and from him I have obtained the following illustration:—

"Very recently," he says, "I was consulted by a Brazilian, whose first attack seemed to have been manifestly brought on by fright. Whilst on a long journey through his country he had gone to a lonely inn, where he happened to witness a quarrel between some individuals who were armed, and who from high words came to blows. One of the men, mortally wounded by the discharge of a gun, as well as stabbed with a knife, fell down dead in his presence. He was horribly affected by the scene, and a few days afterwards, whilst dining with a friend, he was seized with epileptic vertigo. Since that time, and for the next

five years, he was every day affected in the same way. The attacks were ushered in by a sensation of great heat, beginning at the navel, and rising up the back, which was followed by absolute loss of consciousness for the space of two minutes or so. They sometimes passed away so quickly that they were not noticed by anybody near him. At the end of five years convulsive seizures supervened, which were at first mistaken for apoplexy, and recurred at intervals of from twenty to thirty days. The vertigo disappeared from that time. He was treated by a physician at Rio Janeiro, and for the space of four years and eleven months he was free from an attack. After this interval the convulsive fits recurred again, as intense and as regular as before; persisting for six years. They then became less violent again, although more frequent, and occasionally attacked him during the night. He stated positively that no member of his family had ever been similarly affected" (liv, I, p. 52).

In this case it will be seen that emotional excitement, although not causing at the time epileptic convulsions, acted powerfully upon the vaso-motor nerves of the brain, and induced the morbid condition of the capillary circulation which characterises the *petit mal*. The tissue originally affected was the involuntary muscle of the cerebral vessels; the convulsive affection of the voluntary muscles being long subsequent.

We may fairly draw an illustration from the customs of the Sandwich Islanders, exhibiting the remarkable influence of the emotions allied with imagination upon the bodily frame, in inducing epileptiform convulsions. Mr. Ellis says that when a priest imagined that the god had entered his person, he became violently agitated, the muscles of the limbs were convulsed, the body swelled, the features were horribly distorted, and the eyes wild and strained. He often rolled on the ground, foaming at the mouth, and then in shrill cries made declarations which were regarded as the utterances of the divinity. Then the paroxysm usually subsided, and the priest became comparatively composed ('Polynesian Researches,' vol. i, p. 373). Doubtless, in some instances, the priests merely *imitated* the signs of the genuine and spontaneous result of the imagination excited by their superstitious beliefs and expectations; but there is no

reason to doubt that in other cases the effects produced were real.

Mr. Ellis observes, in the same work, that if any native uses sorcery against another, whose destruction he desires, he employs a tahu-tahu (a charm), to obtain the co-operation of the demons, and to induce the *tii*, or spirit, to enter into the victim of their malice. The parings of the nail, a lock of hair, the saliva, or other secretions, or a piece of the food which he would eat, was the vehicle by which the demon was supposed to enter the person. The sorcerer performed incantations over it at his house; if food, it was then placed in the basket of the person for whom it was designed, and if eaten, inevitable destruction was expected to follow. When the incantation was performed only on a lock of the hair, &c., the effects appear to have been similar, and death speedy. "The most acute agonies and *terrific distortions of the body* were often experienced; the wretched sufferer appeared in a state of frantic madness, or as they expressed it, torn by the evil spirit, while he foamed and writhed under his dreadful power."

Two boys were sent to a man's house for arum-roots. He was from home, but the boys went to the field and procured them. The owner, who happened to be a sorcerer, returning before they had left, pronounced the most dreadful imprecations upon one or both of them, threatening them with the *pifao* or "agony of body from possession, equal to that arising from a barbed spear or hook." The boys returned. One of them was shortly afterwards taken ill, and his friends concluded it was the result of the malediction. The Missionaries, who were sent for, found him lying on the ground, *writhing in anguish, foaming at the mouth, his eyes starting from their sockets, his face distorted, his limbs violently convulsed.* He soon after expired in dreadful agonies. It is said that the boys "apparently took no notice of the threatening," but on this important point, more definite evidence would be required to prove that they did not. But whether they did or not at the time, their superstitious friends would not fail to impress them with their danger, and thus the most credulous or susceptible of them would be in danger of falling a victim to Fear.

On the whole, looking at the character of the symptoms in

this and other cases, as also their general uniformity, there can be no doubt that, setting aside those instances in which food was taken and poison probably introduced, many deaths resulted from the influence of Terror and Expectation upon the organic functions. To the same conclusion the thoughtful and observing writer to whom we are indebted for these particulars is conducted. "Imagining he was already delivered to the sorcerer's power, hope was abandoned, death deemed inevitable, and the infatuated sufferer became the victim of despair." It is quite in accordance with this mode of explanation that the Europeans were proof against the incantations of the sorcerers.

Infantile Convulsions.—Dr. Arthur Mitchell, in his 'Morisonian Lectures on Insanity,' records a melancholy example of the influence of Fear in inducing convulsions (and subsequently idiocy).

"A healthy, well-nourished boy, nearly two years old, was lying in his cradle, when a cock perched on the hood. The boy was at first amused and delighted, and made vain efforts to reach the bird with his hands. These signs of delight, however, began to grow less evident, the child ceased to smile, but his attention continued to be intently fixed on the animal, which, in its turn, appeared to become interested in the child. Up to this point the little fellow gave no sign of terror; but there was something like it, though still unexpressed, when the cock, stretching his neck, put his head down and looked closely at the boy's face; and when, raising his head again, he flapped his great wings, and uttered a shrill cry, the child gave one sharp cry of pain, and was instantly convulsed. Three or four fits occurred during that and the next day, but never again. The boy, however, grew up an idiot" (xxxii, March 19, 1870).

It is well known that *Puerperal Convulsions* occur frequently from psychical causes. Dr. Gooch, than whom few have had more experience, observes that "depressing passions of the mind produce this complaint; unmarried women, who have passed the latter months of pregnancy in solitude and wretchedness, are very likely to be attacked with it; and it is found in lying-in hospitals which admit unmarried women, that a large proportion of cases of puerperal convulsions occur among females of this class." ('Practical Compendium of Midwifery,'

p. 243.) Most of the observations made under Epilepsy apply here. Trousseau (liv, I, p. 32) states very clearly that the convulsions arising in the course of various disorders—eclamptic seizures—are not distinguishable in their character or in their proximate cause from the convulsions of epilepsy. "To speak unreservedly," he says, "I must at once declare that in my opinion epilepsy and eclampsia are two identical neuroses, with regard to their symptomatic expression and their proximate cause. . . . An attack of eclampsia is exactly like one of epilepsy, and no physician will ever be able to distinguish between convulsions occurring in a pregnant woman long afflicted with epilepsy, and convulsions in a woman seized with eclampsia at the beginning of labour." "Eclampsia occurring in a child who is cutting his teeth, or has worms, or is suffering from scarlatinal dropsy, does not in the least differ, as to the convulsions, from an epileptic fit."

This appears to be the most convenient place to refer to other forms of spasmodic muscular action, arising under emotional excitement, and ordinarily styled *hysterical*, and presenting all degrees of irregular movements, from the simplest spasm to the severest convulsion.

When we speak of irregular movements which are considered hysterical in their character, we are in danger of being lost in vague generalities; in no disorder are we so easily carried away by a mere name, as in hysteria. One thing, however, is certain, that while a considerable number of cases are clearly referable to uterine and ovarian disorder exciting reflex action of the sensori-motor apparatus, many as clearly originate directly in emotional disturbance of the same centre. The symptoms arising from these different causes may be precisely similar, and, without the history of the case, it would be impossible to decide as to its psychical or physical origin. If we hold, as undoubtedly we must, that all physical phenomena (including irregular movements) which can be induced by reflex action from the irritation of a bodily organ, can also be induced by central cerebral irritation, then, even if we agree with those who define hysteria as "a reflex neurosis dependent on sexual irritation," we must believe that emotional excitement can primarily produce the same disorders, without

springing from or involving the reproductive organs. At the same time it is manifest that in a large proportion of cases, the condition of the uterus and ovaries in women, and sexual development or disorder in men, induce a morbid susceptibility of the sensori- and excito-motor centres, which renders them peculiarly liable to emotional excitement. The former is the predisposing, and the latter the exciting cause. On the other hand, it must be admitted that, in many instances, the morbid condition of the reproductive organs is itself induced by the downward action of the feelings.

To determine which has been the *point de depart* in this physico-psychal circle is often impossible. We may, however, frequently ascertain how the first outward manifestations of the disorder have originated, and be certain that they have been called into action by a central emotional stimulus. We have in women a constitutionally weaker Will and greater susceptibility to reflex action, but this natural susceptibility, or hyperæsthesia, is no doubt greatly aggravated by uterine irritation. This heightened tendency of the nervous centres to act independently of volition, exposes them to irritation from every source, peripheral or centric, uterine or emotional. When persons in health, subjected to the excitement of popular tumult and alarm, or the influence of religious revivals, display the group of symptoms ordinarily understood as hysterical, we can have no hesitation in acknowledging a psychical—an emotional —cause. That a predisposition or diathesis exists (the female nervous system being in itself a predisposing cause), which occasions the symptoms to be something more than the ordinary effects of Fear—pallor, tremor, &c.—and something less than genuine epilepsy, would seem clear. Emotional states being so intimately connected with hysteria, the attempt is too often made to comprise under this one name, the various phenomena which are excited by powerful and alarming appeals to the feelings, or by fright of any kind, instead of remembering that with different constitutional proclivities, different forms of disorder will be elicited, and not all properly speaking hysterical, although having, in common, the automatic and reflex character belonging to hysteria. All hysterical movements are reflex or automatic, but all reflex movements are not

hysterical, if we employ the term in any distinctive sense at all. While in some, the effects of violent mental impressions are almost *nil;* in others, slight tremor and pallor; in others, syncope; and in others, convulsive seizures, which in those predisposed or subject to epilepsy will be really epileptic; in a fifth class we see what every one recognises as a fit of hysterics, or hysterical simulations of epilepsy and other motor affections. Of course the attack takes its colour from the character of the excitement which produces it, as is witnessed in religious revivals. Were we to take our description of the scene often presented on such occasions from the accounts of one which occurred more than half a century ago in Cornwall (when four thousand in various towns—Falmouth, Redruth, Camborne, &c., were convulsed), and compare it with the descriptions so frequently given in recent times of the effects produced in America, Ireland, and England by excited harangues and denunciations of eternal perdition,* we should not fail to find a striking similarity in the symptoms. For instance, the account given in 'Fothergill and Want's Medical and Physical Journal' (lxix, p. 145), so long ago as 1814, would do as well now as then for one class of cases. Thus we find—Yawning, violent spasms of the muscles of the eyelids, the eyeballs themselves being fixed and staring, frightful contortions of the countenance, then convulsions (passing downwards) of the muscles of the neck and trunk, sobbing respiration. General agitation and tremors, the head thrown from side to side, convulsive beating of the breast, and clasping the hands, accompanied by many frightful gestures, followed; the lower extremities alone escaping. At Ballymena, at the commencement of the Irish Revivals, the physical phenomena were very similar, and others were present of a more tetanic character. We are indebted to Dr. Massie's 'Revivals in Ireland' for the following illustration of the influence of the emotions upon the

* The writer himself heard the following from one of these preachers:—Addressing "the dear children," he exclaimed, "If you are wicked you will go to the devil, and live with him and his angels. Won't it be very awful to be put into a great blue flame? Your hands will be all burnt with the big fire, and your feet and all your body; and the worst of it is that you will be always burning, and yet never burnt out!"

body, especially the muscular system:—A neatly attired young woman, about 22, had been stricken an hour previously, and was supported in the arms of an elderly female, who was seated upon a low stool. Her face was deadly pale, her eyelids firmly closed, except when partially raised by a convulsive paroxysm, and then no part of the eye was visible, except a narrow line of white; pulse intermittent; great perspiration; arms extended or elevated, and then the hands clasped with great energy, and her features rigidly fixed into an expression of supplication; utterance rather incoherent; agonising expressions of despair. A striking expression is employed in one description of the stricken. "In all cases it appeared as if every fibre of the heart and every muscle of the body were wrung with the same excruciating torture." A young woman is described as lying extended at full length; her eyes closed, her hands clasped and elevated, and her body curved in a spasm so violent that it appeared to rest, arch-like, upon her heels and the back portion of her head. In that position she lay without speech or motion for several minutes. Suddenly she uttered a terrific scream, and tore handfuls of hair from her uncovered head. Extending her open hands in a repelling attitude of the most appalling terror, she exclaimed, "Oh, that fearful pit!" During this paroxysm three strong men were hardly able to restrain her. She extended her arms on either side, clutching spasmodically at the grass, shuddering with terror, and shrinking from some fearful inward vision; but she ultimately fell back exhausted, nerveless, and apparently insensible. In a third case, the face of a woman was deadly pale, the features rigid, the lips clenched, the hands clasped firmly together, and the head moved from side to side, as if to indicate internal agony.

At other times the force of the emotions fell chiefly on the vagus and spinal accessory; the thoracic muscles were spasmodically fixed; "an intolerable weight was felt upon the chest, and a choking sensation experienced." Such cases have more especially suggested the employment of the word hysteria in reference to the revival cases, because the most prominent symptoms of hysteria betoken functional disorder in the range of the respiratory nerves.

It is obvious that many restrict the term hysteria to those

cases in which there exist symptoms which common consent attributes to it (sobbing respiration, globus hystericus, &c.), in full force at the time, and doubtless they constitute typical examples; but without these we may strongly suspect from some one symptom in the history of the case, that the same morbid susceptibility of the nervous centres is present, and causes reflex phenomena, which are the counterfeits of nearly all the disorders to which the frame is liable. The single circumstance of the disorder occurring in a young female (*e.g.*) is itself a presumption in favour of the hysteric character of this susceptibility.

The important point here (though not nearly so much so as to distinguish between functional and organic disease) is not to refer to this hysteric susceptibilily or exaltation, reflex phenomena which arise without any evidence whatever of its having been present; for clearly an excessive stimulus of the emotional centre may cause a healthily susceptible sensori-motor apparatus to respond too violently, in short, convulsively. To which class to refer phenomena which are often so closely allied is a question the decision of which will depend upon the whole history of the particular case. Hence and from using the term in the broad and narrow sense, differences of opinion arise. Thus we find Dr. Cuthbert, of Londonderry, himself a witness of many of the Ulster revival cases of 1859, protesting in the 'Medical Times and Gazette' of Nov. 5th of that year, against what he regards as the too indiscriminate reference of the whole to the convenient category of hysteria. There was, he says, one class of cases in which the mental condition appeared to regulate altogether the physical state, and there was no globus or diuresis; cold water assiduously applied had no effect; with returning mental quietude the bodily symptoms declined. In a second class the morbid symptoms were no doubt hysteric, and the term "cataleptic hysteria" is applied to them by the writer. Lastly there were cases in which hysteric symptoms arose, not, apparently, directly from the impressions produced on the mind by the Revivalist preachers themselves, but as the result of sympathy and imitation. In a letter written recently (June 16, 1870), Dr. Cuthbert informs me that he believes the conclusions he then arrived at to be

correct. "In a large number of cases the physical symptoms were but the natural expression of mental impressions. I still consider that the symptoms in a large number of cases were not those of hysteria." I may add a significant remark, although it has nothing to do with my present object—"The good effects, I think, were *in inverse proportion* to the physical manifestations." I should observe that in the cases which came to Dr. Cuthbert's knowledge, prostration, rather than convulsion, was the prominent feature, and that they do not, therefore, correspond in their character to those described in 'Fothergill and Want's Journal,' which, with some variation, were re-produced in some of the Irish Revivals.

Dr. Babington (lxix, p. 157) quotes from the third vol. of the 'Edinb. Med. and Surg. Journal' an account of a convulsive disorder in the Orkney and Shetland Islands written about a century ago, from which an extract may be given here. "At first this distemper obtained in a private way, with one female, but she being seized in a public way at church, the distemper was communicated to others, but whether by the influence of Fear or Sympathy is not easy to determine. However this was, our public assemblies, especially at church, became greatly disturbed by their outcries." "When any violent passion seized them, or on a sudden surprise, they would all at once fall down, toss their arms about, with their bodies into many odd shapes, crying out all the while most dismally, throwing their heads about from side to side, with their eyes fixed and staring." "Few men are troubled with this distemper, which seems more confined to women, but there are instances of its seizing men, and girls of six years of age. With respect to the nature of this disease, people who have made inquiry differ, but most imagine it hysterical; however, this seems not entirely the case, as men and children are subject to it; moreover, it is a new disease in Shetland, but when imported none can imagine . . . . In Northmaven a cure is said to have been effected by a very singular remedy, which if true, and there seems no reason to doubt it, shows the influence of natural causes in removing, as well as inducing convulsive disorders." Dr. Babington adds "the cure is attributed to a rough fellow of a Kirk officer, who tossed a woman in that state, with whom he had been

frequently troubled, into a ditch of water. She was never known to have the disease afterwards, and others dreaded the same treatment."

That emotional disturbance can produce hysterical movements and other symptoms, in the male sex, and not only so, but without any connection with the development or disturbance of the reproductive organs, is well illustrated by the following case reported by Dr. Wilks (xlv, March 13, 1869) :—

"Some months ago I received an urgent message to visit a gentleman, a short distance from town ; when I arrived at his house he was sitting in his parlour, and not looking ill. I expressed some little vexation at being summoned so hastily. He said he was now much better, and commenced explaining to me the reason of the summons, when he began to cry ; presently the cry reached the stage of sobbing ; this became louder and louder, and more violent, until it changed into a laugh, which he was totally unable to suppress, and I became a witness of the most marked attack of hysterics that I had ever seen in either sex. He presently fell back in the chair, quite exhausted. He was a man thirty years of age, with a large black beard, and had as manly an appearance as you would wish to see. His wife then told me that he had been speculating, that he was a ruined man, and would have to leave his house and family. He had returned home that evening shortly before I was sent for, and the thought of the prospect before him was more than he could bear, and thus the cause of the attack. Whilst she was relating this he grew calm, and then commenced to talk to me, saying how foolish he was, but could not refrain from referring to the circumstance of his misfortune. He had not proceeded far when he was again overcome: another laugh commenced, and then he broke out into such a loud and involuntary fit of laughter, that the noise could be heard throughout the whole house. It only ended with his utter exhaustion. I saw him a few days afterwards, and he was pretty well. This gentleman had simply an hysterical attack from violent emotion."

The great importance of distinguishing between the hysterical counterfeits of disease, and forms of disease involving more or less structural change, has been already referred to. Only

the other day a case of convulsions, which was pronounced to be hysterical by Trousseau, was regarded by Dr. Handfield Jones as undoubtedly epileptic. The fact is, the diagnosis can often be certainly made only when the case has issued either in recovery or death, for the strongest diagnostic sign is that the symptoms of hysteria, however alarming, whether resembling coma, convulsions, tetanus, or paralysis, do not tend to endanger life or prove permanent; at least in these forms, for they may end in insanity. Emotional excitement, acting centrally, induces an imitation of the corresponding diseases originating in organic change, just as can at any time be induced by Braidism in susceptible subjects. It has this feature in common with all functional affections; that it is a disorder which may quickly come and as quickly go, demanding a treatment and admitting of a prognosis, wholly different from those called for in one which involves structural changes.

From our present standpoint, a purely emotional one, we have only to admit that if a powerful emotion be aroused, whether from without or from within, it may discharge itself through the sensori-motor ganglia upon any of the nerves and muscles of the frame, so as to cause tonic or clonic spasms—the globus hystericus being the natural sequel of irritation of the medulla at the point of origin of the vagus or accessory. Should the emotion, however, by its action on the vaso-motor nerves, violently contract or dilate a feeble or atheromatous vessel in the brain, or overstrain the nerve tissue itself, serious and fatal organic changes may follow, and such cases are at once understood to belong to the non-hysterical class. When we see two cases of hydrophobia,—one caused by actual virus, the other by emotion,—it is easy to understand (and can be practically demonstrated by Braidism) how the latter is but the reflection of an image of the real disease intensified by Fear, and that the symptoms may pass away when the image is removed from the mind, but otherwise may prove fatal. So of chorea: we can see that an affection of the cardiac valves which causes embolism and consequent chorea, although producing the same muscular movements, involves a very different physical condition from that which obtains in chorea of

emotional origin. There may or may not be symptoms in combination with it, which warrant our reference of these cases to hysteric excitability.

Whenever the emotions master the Will, the muscles are liable to spasm; when voluntary power is first embarrassed, and while the struggle is maintained, muscular *tremors* occur. It is afterwards, when the Will is subdued, that various spasmodic movements take place. In reference to the tremor constantly witnessed as the result of Fear and Joy, and consistent with health, it is unnecessary to do more than to state the fact, and pass on to the serious pathological condition marked by tremor, and frequently produced by emotional states.

Trembling Palsy, Paralysis Agitans.—Medical experience fully confirms the remark of Marshall Hall, that by far the most common cause of the accession and of the aggravation of paralysis agitans is Emotion; hence during sleep the movements are calmed. Hall cites the case of the Abbé —, who, during the reign of terror in France, was seized by the mob with cries of "à la lanterne!" He escaped, "but he was ever afterwards subject to violent tremor of the limbs." Also that of a gentleman in whom the disease was induced by the mental anxiety occasioned by a ruinously expensive parliamentary election. He was unable to walk alone, but walked very well "if his wife gave him her hand in the gentlest manner." The loss of power over his muscles was complete when anything occurred to excite agitation or emotion. In a third case, the disorder also originated in anxiety about money; and the son of this patient being entrusted with a large sum of money to convey to a bank, and delaying his return by going to the theatre, was the cause of a great aggravation of the symptoms, almost amounting to hemiplegia. M. Hall, who speaks of paralysis agitans as emphatically "a disease of emotion," adds that he could adduce many examples of the same kind as the above (xvii, p. 23).

A case of paralysis agitans, under Oppolzer, is an excellent illustration of the disorder:—

The patient, a man, æt. 60, happened, during the bombardment of Vienna in 1848, to get in the midst of the fight. He was struck with such terror that he could not return home by

himself, and had to be taken there. He had scarcely got over his fright when a bomb burst near his house and alarmed him again. A few hours afterwards, on trying to take some food, he found himself perfectly unable to use his hands, because as soon as he tried to move them, they began immediately to tremble violently. He noticed also after a short time that his lower limbs trembled in the same manner, but less violently, so that he could still walk. The disease not only resisted all the measures employed against it, but also grew gradually worse. The trembling persisted even when he lay down; and involved other muscles; lastly, paralysis was superadded to it. After a few years, he became incapable of standing erect, and, as soon as he made the attempt, he had an irresistible tendency to fall forwards; so that in order to avoid falling down, he was obliged to lay hold of neighbouring objects, or to walk hurriedly. The keenness of his senses and of his intellectual faculties had diminished slowly, but progressively. Twelve years after the fright he fell down in a fit, and was unable to rise, though not unconscious, and a few weeks after was admitted into the Hospital under Professor Oppolzer, from whose observations Trousseau gives the particulars. On admission the muscles of the face, tongue, neck, and upper limbs were affected with violent trembling, only suspended during sleep. The tremulous muscles were at the same time rigid. His strength rapidly diminished; he had severe convulsive seizures, and he died three weeks after admission. A *post-mortem* examination revealed, among other appearances of less importance, very decided induration of the *pons Varolii* and the *medulla oblongata*. The spinal cord was firm, and the medullary substance of the lateral columns, principally in the lumbar region, presented opaque grey striæ. On making a microscopical examination, there was found in the substance of the *pons Varolii* and *medulla oblongata*, an abnormal production of connective tissue, accounting for the induration of those parts. The opaque striæ in the lateral columns of the cord were due to the presence of connective tissue in process of development. In the substance of the *right optic thalamus* there was an apoplectic cyst of the size of a small bean, the walls of which contained pigment. (For the case in full, see liv, I, pp. 446-9.)

In another case of paralysis agitans, reported by the same physician, the disorder originated in "deep emotions:"—

The patient, an advocate, had attended his wife assiduously for a twelvemonth before her death. Grief and sleepless nights had exhausted him. Such nervous irritability followed, that he could not bear to hear the ringing of bells, or the least noise. He soon observed that his arm seemed to shake slightly, and that the movements of the whole limb, but of the hand especially, became more and more difficult. In a short time the leg on the same side became affected also, and his symptoms grew worse, without being at all benefited by treatment. After a time he had to give up writing. Trousseau remarks that the patient looked like a paralytic, but on examining him carefully, it was soon made clear that the paralysis was only apparent (liv, p. 442).

Of spasmodic affections we will now take *chorea* to illustrate the influence of the emotions upon the nervous and muscular systems. Emotion may so injuriously affect the nervous system that the Will can no longer direct or control the muscles, which then become the sport of the sensori-motor apparatus. Dr. Carpenter well expresses the condition present in chorea as "an augmented and perverted activity of the sensori-motor centres," along with diminished power of the Will, exerted through the cerebrum. One of the reasons he assigns for holding that its special seat is at the summit of the cranio-spinal axis, where it comes into connection with the cerebrum, is "the aggravation of the movements by emotion," this fact "being inconsistent with the idea that the proper spinal centres are essentially involved, although they are frequently affected coincidently or subsequently" (viii, p. 869).

Emotional excitement may therefore originate the disorder, or when once established, whether arising from this or another cause, may induce the spasmodic twitches which characterise the disease.

Dr. Todd gives the case of a boy, æt. 9, thin, but otherwise healthy-looking, who, a day or two before the symptoms appeared, was much frightened by his sister, who had covered herself with a white sheet and appeared before him unexpectedly while he was in bed. "There is here, then," observes

Dr. Todd, "that which we so frequently—indeed, I might say, so constantly—observe, namely, the connection of sudden fright with the origin of these cases. . . Although a certain diathesis seems to be always present in cases of chorea, the disease seldom occurs without some sudden emotional excitement, such as fright." None of this boy's family had been similarly affected, but there was a tendency to rheumatic complaints, and the patient himself had been attacked with rheumatic fever (giving rise to endocarditis) ten weeks before admission, and two months before the appearance of the choreic symptoms, which came on suddenly. The boy went to bed as well as usual, but in the morning, when his mother went to give him his breakfast, she was surprised to find that he could not hold his cup, and that he was quite helpless. He had lost the power of directing his movements properly; the motions of his limbs were exaggerated and ungovernable, and if he attempted to take hold of anything, his arm appeared to be violently jerked, in the right direction, perhaps, but usually beyond the object of his search, as if by some power over which he had no control. Among the early symptoms which manifested themselves in this way was difficulty of deglutition, which came on and continued for some days prior to the more common and characteristic symptoms. The dysphagia was due partly to the want of full contracting power over the tongue, and partly to a want of due harmony in the action of the pharyngeal muscles. This symptom is peculiarly interesting, from the marked connection which subsists between this malady and emotional excitement. The treatment of this boy consisted of splashing him with cold water every morning, and at the same time feeding him well. He improved much in general nutrition, the irregular movements diminished, and when the report was made —eighteen days after admission—he was able to walk without assistance.

Dr. Todd gives the details of two other cases of emotional origin, one a girl, æt. 14, with a history of rheumatic fever when two and a half years old, who was met and accosted about three weeks before the appearance of the symptoms by a drunken man, and was very much alarmed at the time. On this case Dr. Todd remarks that, although the interval seems

very long, "I think we may fairly refer the excitement of the disease to this cause; in many instances, indeed, even longer periods have elapsed between the fright and the accession of the malady. . . . I have known it occur six weeks before the chorea manifested itself."

In the next case, the patient, æt. 12, was a sister of the foregoing and was frightened by a drunken man, a few days after which she felt pain in the right arm and leg, and experienced a tingling in the fingers, which became restless and fidgety. Soon after, the left extremities became similarly affected; then came twitchings in the face, and in the course of a fortnight from the time of the fright, irregular movements became general; she lost the power of standing or walking, and her articulation was almost completely destroyed. In both these cases recovery followed the splashing treatment, followed by quinine and iron* (lxxiii, p. 428-39).

The opinion of Dr. Todd as to the seat of emotion has been referred to at p. 113 of this work, and he observes on these cases, "If I were to refer to any particular part of the brain as more particularly the seat of the disturbance, which gives rise to the development of the peculiar phenomena of chorea, it would be to that which may be regarded as the centre of Emotion. The remarkable frequency with which the attack of chorea is traceable to fright as its cause, points clearly to this part of the brain (which has the most extensive connections with, and influence over, other parts of the nervous system) as the *primum movens* in the production of choreic convulsions. The chain of phenomena would then be as follows:— First, a peculiar diathesis, then a more or less enfeebled nutrition; thirdly, a strong mental impression, which disturbs the centre of Emotion, and through it deranges the action of more or less of the nervous system, and of a corresponding portion of the muscular system."

One of the worst cases I have seen was caused by fright in consequence of fire in the house in which the patient, a woman, lived. She was admitted into St. Bartholomew's Hospital on the following day. Romberg, after stating that

* These cases are abstracts of the original, chiefly in the language of Dr Todd's Lectures.

the emotions, especially fright, occasionally induce the disease suddenly, adds that he remembers having a girl of ten years of age under his care, who had been violently alarmed one morning by a dog jumping and barking at her, and was seized in consequence with chorea, the same evening (xxxiv, II, p. 59). In these cases, violent mental excitement must have produced such a change in the nervous tissue, that the normally superior power of volitional over muscular movements was suspended or destroyed, and the sensori-motor apparatus left to its uncontrolled automatic action, or perhaps it would be more correct to say that the co-ordinating power is suspended, for automatic action is not necessarily spasmodic. As in epileptic and other convulsions, it is easier, however, to say from our knowledge of the physiology of the nervous system, what part is in an abnormal condition, than to determine in regard to vascularity and innervation in what it consists, and how it is brought about. Probably all we can say with certainty, is that the shock which the brain receives from a violent emotion like Terror, disturbs the normal relative vascularity and nutrition of the volitional and motorial centres.

Popular tumults are well known to have occasioned attacks of this troublesome complaint. During the Bristol riots of 1833, an excited imagination as to what might occur, acting through Fear, produced this result. Dr. Carpenter says that a remarkable number of cases were admitted into the infirmary there, within a few weeks afterwards. He also mentions a case in which any, even trifling agitation of the feelings, caused the most extraordinary contortions of the limbs and face. "This gentleman, a man of education and intelligence, of extreme benevolence of character, and a mind habitually well regulated, can scarcely walk in the street without being liable to the induction of paroxysms of this kind, by causes that could scarcely have been supposed capable of thus operating. For example, he was one day seized by one of these attacks in consequence of seeing a man miss his footing (as he thought) in descending from the top of an omnibus; and the pleasurable excitement of meeting a friend usually induces the same result. The tendency varies very considerably in its degree, according to the general condition of his health" (viii, p. 791).

Trousseau, after observing that deep emotion from any cause and more particularly fright, is a determining cause of St. Vitus's dance, gives the following:—

"The young girl, 16 years old, who lay in bed 30, St. Bernard's ward, afforded an instance of this. Her previous health had always been good; she had never had rheumatic pains (and careful auscultation detected no sign of cardiac disease), and her complaint dated a fortnight back. A man caught hold of her one evening as she was going downstairs without a light, and she was so frightened that she had a nervous fit, and from that moment became affected with St. Vitus's dance. The disease was developed to a pretty high degree, and her case could be regarded as typical.

"Several among you may recollect another girl, aged 17, who was sent into my ward by Professor Jobert, in December, 1860. She had an artificial anus in the umbilical region, which had rendered a surgical operation necessary. She had always been very nervous, and had a strange temper; and she was so alarmed by the operation that she was immediately seized with St. Vitus's dance, which was very grave, was attended with delirium, and got well by slow degrees also. The invasion of St. Vitus's dance is rarely sudden as it was in these two instances" (liv, I, p. 397-8).

Trousseau puts the practitioner on his guard against exaggerating the gravity of a case of chorea seen by him for the first time, inasmuch as the emotion occasioned by a stranger increases the violence of the convulsions, however the disorder may have originated.

In a case, that of a girl, æt. 18, reported by this physician, and denominated "hysterical," the order of events was:— Fright; suppression of the catamenia, and convulsive jerkings of the limbs and trunk, so violent as to prevent her from standing. Her tongue was similarly affected; hence she was unable to connect the syllables together, although she could articulate them separately. She stammered in a singular manner, repeating with extraordinary volubility, and for a pretty long time without stopping, the last syllables of the word she attempted to say, articulating the first syllables with difficulty. It was a remarkable fact, however, that she did not stutter when she sang,

and no modification of speech could then be suspected (liv, I, p. 434). In a second case, the cause was intense grief from the death of a sister. The patient was a lady, æt. 19. Strange convulsive movements of the head and upper limbs were the most prominent symptoms. When Trousseau saw her, her aspect was that of perfect health, but her whole left side was the seat of violent choreic movements—so that she was in danger of hurting herself against the furniture. An attempt to arrest them by taking hold of her hand made them worse: there was one means, however, of quieting all this agitation, as if by magic, namely, the piano. She could spend an hour or two at the instrument, playing to perfection, and with the greatest regularity; in excellent time, and without missing a note. This single fact would have been sufficient in Trousseau's opinion to show, in the absence of other proofs, that this was an example of hysterical chorea, and not genuine St. Vitus's dance. When she wished to seize an object, she could do so at once, and would never drop it (p. 434).

We pass on now from well-marked cases of chorea to a few other examples of spasm, more or less nearly allied to it. Fear, in the form of a vivid dream, has produced spasmodic action of the muscles. The case of a peasant is related by Tissot, who having dreamed that a snake had coiled itself round his arms, started out of sleep much terrified, and was afterwards subject to spasmodic movement of the arm, sometimes lasting for an hour at the time, and returning frequently in the course of the day (lx).

Dr Althaus, in the 'Medical Times and Gazette,' May 25th, 1861, reports the case of a lady suffering from spasmodic contractions of the left trapezius and cleido-mastoid muscles, consequent upon a violent emotion excited by witnessing an accident in the street:—

"At first the contractions were slight and only occurred when the patient was excited, when in society, or if spoken to. The affection gradually became stronger and more troublesome." There was no pain unless the contractions were unusually violent. Dr. A. says, "the influence of emotion in exciting the trembling and spasms of the muscles was most striking in this case. The patient said that she suffered far less when she was alone and if

the room was darkened; but if she thought herself observed and the object of wonder and pity, she became much worse; she had therefore, almost retired from society, and was only with difficulty induced to leave her rooms, from which she used to shut out the light. It may be added that blisters and purgatives produced no, and valerianate of zinc but slight benefit, while Faradisation of the muscles and skin soon effected a complete cure, not a trace of the affection being observed, even when she was excited."

Dr. Althaus also gives the particulars of a case of the same disorder in a brewer, following and apparently due to the circumstance that when "driving, his horse fell and broke his neck, which gave him a great shock." He had also had much anxiety, but it ought in fairness to be mentioned that shortly before the attack he slept on a damp couch. He was benefited by the remedy employed in the last case, after calomel and laudanum, blisters and leeches had wholly failed to give relief. Dr. A. makes a remark which deserves to be preserved here. "In cases in which the emotional nature of the complaint is strikingly apparent, Faradisation of the skin, which produces a powerful impression upon the nervous system, is preferable. If the influence of emotion is less marked, and the reflected muscles are only slightly rigid, while the nutrition of the corresponding muscles of the other side of the neck is impaired, Faradisation of the latter ought to be performed in order to restore the lost equilibrium."

The influence of emotion in causing spasm of the muscles of the *larynx and glottis* ("asthma thymicum"), is well illustrated by the following case from the 'Annales Médico-psychologiques', 1849, p. 450:—

Marie Meyer lost her child, eight months old, to whom she was greatly attached. The grief this circumstance occasioned, produced a painful sense of constriction in the larynx. Emotion of any kind at once aggravated it, causing great difficulty of breathing. On one occasion, for two hours, the attack was so violent, that she was blue in the face, speechless, scarcely conscious, and in fact all but suffocated. On the following day she was admitted into the Hôtel Dieu, Lyons, under Dr. Lavirotte's care, after having suffered from her malady for

seven months. She only remained in the hospital about three weeks, during which she was very simply treated, and left relieved, but not cured. Trousseau, after observing that laryngismus stridulus generally comes on "under the influence of some mental emotion or of a fright," adds "I was once consulted for a little boy, who, from the beginning to the end of his first dentition, was subject to such seizures. He was of a very excitable temperament, and the least annoyance brought on an attack" (liv, I, p. 356).

Paroxysms of cough of an hysterical character are often, as is well known, caused by depressing emotions, but it is not so well known that apparently hysterical cough may accompany and mask really organic cerebral disease. In three such cases reported by Dr. Stokes, there was evidence of meningitis, in one case by post-morten examination, and in the other cases by very suspicious symptoms. "It is a curious fact," he says, "that in three of the most extraordinary cases of hysteric or nervous coughs which I have witnessed, there was evidence of such an occurrence." ('Treatise on Diseases of the Chest,' p. 266).

We may here introduce a case of obstinate *Singultus* the result of Emotion, reported by Romberg (xxxiv). A Polish Jewess, æt. 21, had a violent fright at the first outbreak of the Cracow revolution, and suffered from hiccough in consequence. Three years afterwards she was admitted into the Policlinique, at Berlin. Owing to a complication with spasm of the glottis, it was particularly loud and sonorous. A spasmodic throwing back of the head, during each attack, showed the participation of other nerves than those involved in hiccough. There was tenderness of the epigastrium and of the spinous processes of the lower cervical and upper dorsal vertebræ, leucorrhœa, with regular menstruation. All the remedies previously tried had been ineffectual. It is not stated whether the treatment at the Policlinique proved more successful.

Yawning is produced by sympathy rather than direct emotional influence. Spasmodic laughter (*risus convulsivus*) may arise in both ways, but I am not acquainted with any case of psychical origin in which it assumed a serious form. In a fatal case of physical origin, in which this was a prominent symptom,

the medulla oblongata was found to be the principal seat of disease. Vocal spasms (*stammering* and *stuttering*) are constantly aggravated by bashfulness, while the courage excited by an emergency may remove them, as happened with Charles I, who, though a stammerer, is said to have been entirely free from the affection when he spoke at his trial. "Stammering," Marshall Hall observes, "would scarcely exist without emotion," and he likens it to the nervous tremor which often renders it almost impossible for some persons even to sign their name in public. I have not been able to ascertain that any cases of permanent stammering have owned emotional excitement as their original cause. The spasm of *sternutatio* was in Gall's personal experience excited by erotic feelings. Among the exciting causes of *pertussis* the emotions are well known to play a considerable part. Romberg specially mentions vexation and alarm, while fright, on the other hand, used to be a popular remedy in this disorder, the noise and alarming appearance of a mill-hopper having been employed to frighten a child placed in the corn-bin.

Spasm of pharynx; hydrophobia.—Spasmodic contractions of the muscles of the pharynx have been frequently caused by fear, chiefly connected with the idea of hydrophobia. Such cases illustrate the remarkable influence exerted upon the body by what is popularly understood as the Imagination. It is so frequently associated with an emotion, and owes so much of its force to this element, that it is, as we have before had occasion to observe, often, impossible to separate them and study the action of the Imagination, regarded as the purely intellectual faculty of *imaging*. In the following cases it is obvious that the emotion of Fear had much to do with the symptoms:—

Romberg cites from Chomel the case of a physician at Lyons "who assisted in the dissection of several hydrophobic patients, and was seized with the conviction that he had been inoculated with the virus. He lost his appetite and was sleepless; when he attempted to drink he was seized with choking and spasm of the pharynx; for three days he wandered about the streets in a state of despair, till at last his friends succeeded in convincing him that his malady had its foundation in his mind" (xxxiv, I, p. 183). Trousseau says he has known

physicians—men of strong minds and courage—who, although well aware of the conditions needed for the development of rabies, were subject for several months and even years after attending and dissecting persons suffering from hydrophobia, to more or less distressing attacks of dysphagia, on the mere recollection of the awful scenes which they had witnessed. "Time alone got rid of their nervous susceptibility which manifested itself in the shape of spasm of the pharynx, and they cured themselves of it by appealing to their knowledge of the disease and by forcing themselves to drink some liquid whenever they felt the sensation coming on" (liv, I, p. 692). It may here be observed that, according to this physician, there is in nervous hydrophobia dysphagia only, and no general convulsions, the spasm affecting the pharynx alone, while the respiration is unaffected. If the dysphagia extends beyond four days, the strong probability is that the disorder is not due to any virus, but solely to the Imagination.

Rush wrote an able essay (and when are his essays not able?) on hydrophobia, in which he assigns an important *rôle* to the influence of "Fear" and "an involuntary association of ideas." He affirms, undoubtingly, that cases of spontaneous hydrophobia have arisen from these causes.

It is possible that persons who have been attacked with hydrophobic symptoms after the bite of a dog doubtfully mad, have suffered from the fearful anticipation of the disease only, and not from any canine virus; the inference drawn in such cases that the animal is labouring under the disease being too hasty. When a wound has been inflicted by a really rabid animal, and no effects have followed until many months after, emotional excitement may be the occasion of the outbreak of the symptoms, especially should it be in the form of Fear, and should "the nerves" at the time be in a susceptible state. As Dr. Rush graphically expresses it, the man's fears are then *let loose upon his system* and rapidly produce a dread of water which appears to be wholly unconnected with the previous bite. "It is of no consequence whether the dread of water be the effect of the saliva of a rabid animal acting upon the fauces, or of a morbid excitement determined to those parts by any other stimulus" (lxi, II, p. 203).

Romberg cites a case from Trolliet in which mental emotions excited the disease, three months and a half after the bite had been received. Up to that time the patient had been leading a very quiet life, but after yielding to excesses at a fair, he was in returning met by a dog which suddenly attacked his horse. Then all the details of his own former accident recurred to his mind; a few days after, hydrophobia made its appearance, and carried him off on the third day (xxxiv, II, p. 145).

The Memoirs of the Royal Society of Sciences of Montpellier contain a history of two brothers bitten by a mad dog, one of whom went to Holland, and did not return for ten years. Learning on his arrival that his brother had died from hydrophobia, he was seized with hydrophobic symptoms himself, and died (lx, p. 143).

Chomel held that in such cases it is highly improbable that the original virus causes the attack after the lapse of so many years, and that it is much more reasonable to refer it "to the well-demonstrated influence of the Imagination in the production of rabiform hydrophobia." While admitting that spontaneous hydrophobia might end fatally, he regarded all cases of hydrophobia, terminating in recovery, as originating in causes independent of the virus. Trousseau is inclined to limit the influence of the virus to a period of about twelve months; all cases occurring susequently being more probably due to the Imagination and Fear.

In Tardieu's Report on Hydrophobia ('Gazette Hebdom.' 1860, No. 3), it is stated that in 147 cases in which the exact period of incubation had been accurately ascertained, it was in 9, from six to twelve months. In the majority of cases (93) it was from one to three months—it being rare for hydrophobia to develope itself after this period. Death followed in all the cases to which the Report relates—239 in number; in the largest number the duration was four days, in one instance nine.

Emotional excitement not related in any way to the disorder appears able to develop an attack, if the virus is latent in the system. A few months ago a painful case of this kind was reported in the 'Daily Telegraph' as occurring in the United States, of which the following is a condensed account:—A

young woman went into her father's farmyard to kill chickens. One of the birds was picked up by the house dog, which ran off with it, and on being pursued by the girl bit her frightfully, lacerating the arm. Her mother and brother, who came to her assistance, were also severely bitten. The wounds of all three, nevertheless, healed in the course of time, and the matter had been almost forgotten, pushed out of memory indeed by a much more interesting event—the approaching marriage of the girl. All went on well for about two months, till the wedding morning, when the mental excitement, which assails the human subject of either sex—but notably the gentler—just before an event which may prove the crisis of a lifetime, brought on a shiver at the sight of water when she was about to wash, followed by other symptoms of a hydrophobic character. Although the symptoms were so alarming, she went through the ceremony; but scarcely was it over when she was seized with spasms, and after a rapid succession of paroxysms, died in her husband's arms. It is added that the other members of the family who were bitten by the same dog had as yet felt no bad effects, but lived in hourly dread.

There is one remarkable case reported by Busnout, and recorded by Chomel, which (if free from any source of fallacy) is an excellent example of hydrophobia of emotional origin, proving fatal in its termination :—

A woman, æt. 34, received the intelligence of the death of her husband. She was violently distressed. On the following day she drank nothing except a little broth in the evening, and complained of heat and a sense of constriction in the throat. After a restless night, the sense of constriction increased. In the evening swallowing became more difficult, and she expressed a horror of liquids; the sight of fluids or a current of air causing a shudder or convulsive twitches. Her expression was wild and wandering, and she frequently spat. Any bright object induced a paroxysm of fury and convulsions. On the fifth day the patient died, completely exhausted. ('Dict. de Med.,' t. xv, p. 590.) But this was not all. She is stated to have communicated the malady to a pet dog which often licked her face (including the lips) during her illness. For a fortnight after her death it showed no signs of madness, but at the end of that

time the usual symptoms made their appearance, and four days after the dog died. The woman and her friends were certain she had not been bitten by a dog.*

Copland cites from Pinel (without a reference) the case of a soldier alarmed at midnight by his comrades, who was immediately attacked with convulsions, burning and constriction of the throat, dread of liquids, and expectoration of a copious frothy saliva. "In the morning, the horror of fluids and the burning pain in the throat were more intense, accompanied with a sense of weight in the head, hurried and irregular respiration, feeble intermittent pulse, and intolerance of light, but without alteration of the intellectual functions. He was certain that he was never bitten by any animal. The symptoms increased and he died. The examination presented nothing extraordinary. A quantity of mucus only was found in the throat" (lxx, Art. "Rabies").

Quite recently (xlv, June 18, 1870) Dr. Finlay has reported a case of nervous hydrophobia occurring in a boy of 12, "produced simply by mental anxiety and terror":—

In the beginning of the year he was bitten by a small terrier on the left leg. The wound was slight, and healed without difficulty. No ill effects were observed, as regards the bite, for two months, but in the interval he complained of pains in the chest, and spat blood, for which he attended the Brompton Hospital. In the beginning of March he complained of severe pain in the leg, at and about the bitten part, at first stationary, but afterwards it assumed the form of an epileptic *aura*. He described this sensation as a peculiar creeping pain, which progressed gradually to the heart, having reached which, insensibility occurred, accompanied occasionally by twitching movements of the extremities and of the muscles of the neck and face. Bromide of potassium was ordered. A week afterwards he said that after the *aura* had crept up to the abdomen, he felt as if the dog that had bitten him was in his inside scratching violently; while during the fit he barked, and his expression was wild, fierce, and haggard. Salivation marked the close of the fit. Next day he attempted to bite and scratch all within

* So remarkable a case should, however, be received with caution, unless we may regard it as confirmed by similar cases.

his reach, and in many respects imitated the actions and gestures of a dog. Sometimes, *e. g.*, he would seize the pillow with his teeth, growling the while as a dog does with a rat. Occasionally he refused food, unless allowed to lap it, while, when threatened with a whipping if he would not stop barking and biting, he would turn round and whine as a dog does when struck. On the 10th day the symptoms were aggravated, and the saliva at times thick and glutinous. As he had not slept for two nights he was ordered chloral, and continued the bromide. Two hours' sleep followed the second dose of chloral. Next day the lad was very violent, and in the evening was with difficulty restrained, the barking and howling being loud enough to be heard in the street. Pulse rapid and weak. After taking 30 grains of chloral he slept seven hours, but was more violent than ever after he woke. When presented with another dose of chloral, he became violently convulsed at the sight of the glass. Similar convulsions were produced by showing him wine, water, &c.; in fact, he refused all fluids. Dr. Finlay attributes this refusal simply to a suspicion that the chloral would be thrust on him in some other mixture. The bromide appeared now to have most influence upon the fits, and at the end of a fortnight from the commencement of the attack, the fits were only occasional, *but yet he sometimes barked during sleep.* The latter is an interesting circumstance. The patient was now removed to St. Mary's Hospital, where he soon completely recovered under the care of Dr. Handfield Jones.

To the foregoing it should be added that the dog appeared to show no signs of rabies, but as the boy constantly asserted that he could not recover till he saw the dog dead, it was decided to kill it. Difficulties, however, were thrown in the way, and it was not until some weeks had elapsed, and the boy had quite recovered, that the matter was decided in court, nor is it stated whether the dog was ultimately destroyed. Dr. Finlay is decidedly of opinion that the bite in itself was innocuous, and that the boy's symptoms were referable to the "Imagination, wrought upon by intense mental excitement and overpowering Fear, conjuring up all the horrors of the actual disease, till some of its peculiar effects were in reality produced."

Sometimes there is, properly speaking, no spasm whatever

of the pharynx, and there is little more than a delusion present—a hydrophobia-phobia, if the term be allowable. It is rather the effect of the action of mind upon mind, than what I intend to convey by the action of the mind upon the body.

Trousseau records several cases of imaginary hydrophobia of this kind. In one, a very mild example, a dog which had bitten a good many beasts that had died of rabies, tried to bite the arm of a gentleman. A few months afterwards he suddenly exclaimed, at breakfast, that he was seized with hydrophobia, for he could not swallow either fluids or solids. He was already beginning to rave, when his wife, who only believed that he had eaten too much, persuaded him to induce vomiting by tickling his throat with his fingers. The *malade imaginaire* was relieved, and no more was said about rabies. We need not suppose that here there was even spasm of the pharyngeal muscles; an extra large breakfast (after fasting in Lent) half-choked the poor fellow, who at once recalled the mad dog, and referred the symptoms to a wrong cause.

In another case a judge was out riding with his dog; they met a flock of sheep, and the dog bit those which he could catch, and although he obeyed his master's call, had a strange aspect. He then bit dogs and oxen, swam across a river, and a few hours afterwards died. Shortly after, the judge heard that many of the beasts bitten by the dog had died of rabies. He was alarmed, because he remembered that on the same day the dog had licked his hand several times, and he now found some scars upon it. Seized with terror, he no longer dared to touch water, or to shave himself, and fully believed he had hydrophobia. A medical man tried, in vain, to calm his fears; for several days he was excited and delirious. At last, being told over and over again, that persons seized with rabies died very rapidly, and that he could not, therefore, be rabid, since his dread of water dated already ten days back, he allowed himself to be persuaded, and his dread of water vanished (liv, I, p. 691–2).

So evident is the influence of the Imagination in the development of hydrophobia, that some distinguished medical professors have, as is well known, gone so far as to maintain

that it is always due to this cause. The strange tendency which exists among many reasoners, when investigating the causes of morbid phenomena, to range themselves under one of two exclusive extremes—the first attributing *nothing*, and the last *everything*, to the Imagination—is strikingly exhibited here. Bosquillon, a Professor of Medicine, and Physician to the Hôtel Dieu, was utterly sceptical as to the existence of any virus, and from his observations in that hospital, came to regard the patients admitted for hydrophobia as "nervous" and fanciful. That they died was, he most justly held, no proof that the disorder was not imaginary, for the Imagination is, as we see, a psychical virus itself, which can and does frequently kill. Professor Dick, of Edinburgh, held that hydrophobia in man "is not the result of any poison introduced into his system, but merely the melancholy and often fatal results of panic fear, and of the disordered state of the Imagination." "Those," he adds, "who are acquainted with the effects of sympathy and irritation, and panic, in the production of nervous disorders, will readily apprehend our meaning, and if our view be correct the immense importance of disabusing the public mind on the subject is apparent" (lxii, I, p. 367).

The advocates of this view supported their position by such facts as these:—The existence of any virus has never been demonstrated. The assertion of Wright, Eberle, Hunefild, and others, that the saliva of rabid animals and angry people will, if injected into the blood, produce hydrophobia is denied by a great chemical authority, Lehmann. As the same cause ought to produce the same effect, and as the bite of dogs regarded as mad, is sometimes followed by no symptoms whatever, while the belief that a bite has been received is alone sufficient to cause all the symptoms, it was alleged that it is illogical to attribute them to any virus. The period of incubation, again, is altogether uncertain, differing in this respect from smallpox, &c., and apparently depending upon the strength of the Imagination in the individual. The good effects of cauterization are, it was said, more likely to be due to the distraction of the attention to a painful sensation, and to the definite hope inspired by vigorous treatment, than to the destruction of a poison which must have already entered the circulation and

commenced its deadly work. The benefit derived from the diversion of the patient's mind by music, as recommended by Desault, and from various superstitious practices, countenanced this theory. Lastly, as Demangeon observes, "if the hydrophobic virus has any existence, which to me seems highly problematical, it must be admitted that its effects do not differ in a single characteristic sign from those of the Imagination and certain inflammations of the brain and throat, and it is indisputable that it is often sufficient to calm the Imagination, and adopt an antiphlogistic course of treatment to stop the development of the disease" (lx).

Whatever force, however, there may be in these arguments to favour the relegation of hydrophobia to the domain of the Imagination, few, if any, will now be hardy enough to deny an actual material virus and a genuine, as distinguished from a nervous, hydrophobia. That such grave doubts should have been started is in itself a sufficient proof of the remarkable power exercised by the definite mental imagery of a particular disease, intensified by fear. Elliotson considered that the great distinction between real and imaginary rabies lay in this: that in the latter the fear of swallowing only is complained of, that there is no morbid irritability of the surface to the impression of air, and that there is no sudden catching of the breath.

Dr. Copland admits that it is "not impossible" that true rabies may be produced by mental influence, independently of the operation of an inoculated virus; but he does not allow that spasmodic symptoms, with a difficulty of swallowing, or even a dread of water—a *hydrophobia*—are sufficient proofs of the presence of a disease identical with that which the bite of a mad animal causes. I think, however, it must be admitted that the approximation to identity is as great as can be expected from the operation of a physical agent in the one case, and a psychical one in the other.

The region of the cerebro-spinal axis morbidly affected, in rabies, is generally spoken of as the medulla oblongata. Sch. v. d. Kolk cites with approval the observation of Romberg, that the corpora olivaria are very highly injected in hydrophobia. But the cerebral hemispheres are obviously often involved. Among

the admitted difficulties attaching to the pathology of this disease, that is surely not the greatest which acknowledges the power of the Imagination in combination with Fear, to excite not only a paroxysm in the course of the disorder, but to originate a group of symptoms, by central excitation, which in a susceptible state of the nervous system closely resemble those of genuine rabies.

I have said nothing in the foregoing remarks of the terrible emotions which in genuine hydrophobia afflict the patient, and which, although not the cause, but the effect of the disorder, are at least in their turn the apparent cause of many of the symptoms. One of Dr. Bardsley's patients "fixed his eyes with horror and affright on some ideal object, and then with a sudden and violent emotion buried his head underneath the bed-clothes." Dr. B. inquired the cause. He eagerly asked if the doctor had not heard "howlings and scratchings?" On being answered in the negative, he suddenly threw himself on his knees, extending his arms in a defensive posture, and forcibly throwing back his head and body. The muscles of the face were agitated by various spasmodic contortions, his eyeballs glared and seemed ready to start from their sockets, and at that moment, when crying out in an agonising tone, "Do you not see that black dog?" his countenance and attitude exhibited the most dreadful picture of complicated horror, distress, and rage, that words can describe or imagination paint (lxx, p. 247-8). Lawrence thus graphically refers to the imagination as the immediately preceding cause of symptoms in the course of the disease. "The patient is pursued by a thousand phantoms that intrude themselves upon his mind; he holds conversation with imaginary persons; he fancies himself surrounded with difficulties, and in the greatest distress. These thoughts seem to pass through his mind with wonderful rapidity, and to keep him in a state of the greatest distress, unless he is quickly spoken to or addressed by his name, and *then in a moment* the charm is broken; every phantom of imagination disappears, and at once he begins to talk as calmly and connectedly as in perfect health" (lxii, I, p. 370). Here we see the higher or ideational centres poisoned by the virus, and the sensori-motor apparatus excited secondarily. Theoretically, there is no reason why the former should not be

spontaneously the source of such dreadful mental images as to cause all the foregoing symptoms. That the disease may be spontaneous is, says Chelius, "beyond doubt." Why not, then, from Imagination and Fear?

Tetanus.—That emotion may so powerfully act upon the motor centres, including the spinal cord, as to cause tetanic rigidity of the muscles, can admit of no doubt. It is not so clear why this tonic condition is developed in one instance and clonic spasm in another, nor yet whether, in these several states, different portions of the nervous centres are affected. Weber found that an electric stimulus applied to the cord of a frog was followed by tetanic, and to the medulla oblongata by epileptic, convulsions. According to Dr. Todd, the former effect is caused by the application of the current to the medulla as well as the cord, while the latter effect results from electric stimulation of the corpora quadrigemina and meso-cephale. Brown-Séquard confirms these experiments by his own, on rabbits—a tetanic spasm being produced by a current passed through the cord, and convulsions, as in epilepsy, by exciting the corpora quadrigemina and the pons Varolii. As regards the medulla, tetanic movements of the anterior, and epileptiform convulsions of the posterior, limbs followed. But, as Brown-Séquard points out, in tetanus, hydrophobia, and epilepsy, the muscles, supplied by nerves arising alike from the encephalon and the cord, present the same form of spasm; tetanus itself may arise from disease of the former; and in epileptics, the first convulsions may be entirely tonic, and subsequently clonic.* ('Researches in Epilepsy,' p. 56). However, there seems no difficulty in believing that certain emotional states may induce the same exalted excitability of the grey substance of the cord, as is supposed by Clarke to be aroused by irritation of the peripheral nerves in traumatic tetanus; nor is it difficult to imagine, in more severe cases, the hyperæmia, escape of blood-corpuscles, albuminous exudation, &c., described by the same writer. But, as Handfield Jones well remarks, seeing that Clarke "expressly notices that the lesions of the cord in cases of paralysis, in which there is commonly no spasm, are similar to those of tetanus, it

* For Van Deen's opinion on the insensibility of the spinal centres to any stimuli but the will or emotion, see 'Year Book,' New Syd. Soc., for 1861.

must be inferred that there exists some peculiar invisible modification of the undamaged nerve tissue, which conditionates the particular character and quality of the phenomena" (lxxi, p. 244). This conditioning, predisposing element is, no doubt, as essential to the arousing of tetanic symptoms from emotional excitement, as it is from the irritation of a wound; in both cases the (apparently) same exciting cause may entirely fail to induce the disorder.

It is remarked by Carpenter that although tetanus and hydrophobia are nearly allied, they differ in this, that while in the former the stimulus acts through the spinal cord, in the latter it is frequently transmitted from the ganglia of special sense, or even the cerebral hemispheres, as proved by the well-known fact that the sight of fluids, or the idea of them, causes convulsions; but when we regard both affections in their relation to a common cause—Emotion—it is clear that they may alike be excited by this stimulus, whether called into action through the senses or through the cerebrum.

A good example of opisthotonos, the effect of a violent impression upon the feelings, has already been given among the cases met with in the Irish Revivals. In this case clonic convulsions were also present. In another case, a poor girl, æt. 7, "without the slightest appearance of any previous agitation or uneasiness of manner, was struck prostrate in a single moment. For a short time her body was found to be perfectly rigid, and her face colourless." Those who know how such a condition of the muscles can be artificially induced, will not be surprised to find it said that "the eyes presented an enigmatical phenomenon beyond the power of philosophical reasoning to expound," and that there was a "long, breathless, and unwavering gaze." This condition, which lasted about an hour, illustrates a state of transient, but intense rigidity, which is truly tetanic in its character, however trivial it may seem when contrasted with ordinary tetanus; a disease, whether traumatic or idiopathic, which is certainly a much more formidable affair than anything that is usually witnessed as the result of emotional excitement. Hystero-tetanus mostly affords examples in point. Dr. Carpenter records a case of hysteria, accompanied by a tetanic condition of the muscles, which may fairly be adduced here in illustration

of the action of certain emotional states upon the motor system, the exciting cause of the disorder being the disappointment of the affections, preceded by anxiety and excessive mental exertion.

"Complete opisthotonos coexisted with perfect coma; . . . . then again there was trismus, lasting for five consecutive days, without any other spasmodic action or loss of sensibility; this sometimes alternated with fits of yawning, in which the jaw was held open for half an hour together; at another period, the convulsions had more of the epileptic character, the face being distorted, and the limbs agitated, concurrently with a state of coma, but without laryngismus; with this alternated fits of laryngismus, without insensibility, and occurring during the expiratory movement; whilst, during the whole of this succession, there was paralysis of the extensor muscles of both lower extremities, with paroxysms of the most violent and prolonged cramp in one of them" (viii, p. 879).

We do not forget the altered condition of the blood upon which the convulsive action in hysteria is supposed to depend by Carpenter, Laycock, and others. The latter, connecting it with the gouty diathesis, observes that an individual so affected suffers from an excess of urea or other urinary constituents in the system, which causes, if not eliminated, a paroxysm of gout, or, failing this, anomalous hysteric disease in women, including, among other effects, "spasmodic action" (iv, p. 169). Whether, however, in cases of purely emotional origin the blood is affected, or the symptoms are due to a direct mental action upon the nerves, is doubtful. Not that any difficulty attaches to the idea of the composition of blood being changed by emotion, but when, as in the case of a religious revival, a psychical cause at once produces certain nervo-muscular phenomena, the effect may, perhaps, be sufficiently accounted for without reference to qualitative sanguineous change. Doubtless, in many instances, the condition of the blood acts as the predisposing, and emotional disturbance as the exciting cause, while in others, indulgence in morbid feelings acts as a predisposing cause.

Nor is the influence of emotion confined to hystero-tetanic symptoms.

Dr. Watson, in his 'Principles and Practice of Physic,' states, on the authority of 'Hennen's Military Surgery,' that "terror is frequently the immediate antecedent of an attack of tetanus," and he thinks fright had its share in causing the rapid course of one case which ended fatally in a quarter of an hour (lxxii, I, p. 569).

Catalepsy.—The occurrence of this disorder (one regarded by Copland as paralytic in character; but which seems intermediate between epilepsy and tetanus, as observed by Dr. H. Jones) is rare from any cause, excluding the cataleptic phenomena which are sometimes induced artificially by Braidism, and I am not aware of any case distinctly originating in emotional excitement; but no doubt careful investigation would show that this is not an infrequent cause. In one case, under my own observation, in which I was able to trace the history, there was no evidence of any strong or unusual mental impression having been received.

Since writing the foregoing I observe that Crichton has recorded in his work the following case from Bonetus under "Catalepsy:"—"George Grokatzki, a Polish soldier, deserted from his regiment in the harvest of the year 1677. He was discovered, a few days afterwards, drinking and making merry in a common alehouse. The moment he was apprehended he was so much terrified that he gave a loud shriek, and immediately was deprived of the power of speech; when brought to a court-martial it was impossible to make him articulate a word; nay, he then became as immovable as a statue, and appeared not to be conscious of anything which was going forward. In the prison to which he was conducted he neither ate nor drank. The officers and the priests at first threatened him, and afterwards endeavoured to soothe and calm him; but all their efforts were in vain. He remained senseless and immovable. His irons were struck off and he was taken out of the prison, but he did not move. Twenty days and nights were passed in this way, during which he took no kind of nourishment, nor had any natural evacuation, but then gradually sunk and died" (lxiii, II, p. 24). It is to be regretted that more particulars are not given in regard to the muscular system.

Among the causes of cataleptic seizures, Copland enumerates

the following predisposing and exciting ones, namely, among the former, violent and continued sorrow, great anxiety, unrequited affection, intense and sustained mental applications, and religious contemplations; and among the latter, some violent mental impression, religious enthusiasm, the passion of love, frights, terror, or uncommon dread, concealed mental emotions, and ungratified passions (lxx, Art. "Catalepsy"). After observing that he has had several opportunities of examining the phenomena of catalepsy from the commencement to the cessation of the attack, he says—"It is very remarkable how instantly a female, subject to catalepsy, is seized with it upon being startled or affected suddenly and unexpectedly by any cause. The effect is as immediate as that produced by lightning, and although the power of motion is entirely and universally lost, yet sensibility is often but little impaired." ('Palsy and Apoplexy,' p. 229).

Lasègue states that he met in one year with ten cases, in a large practice among hysterical females. He found one class specially, if not exclusively, liable to this affection, those, namely, who were sluggish and more disposed to shed tears than be excited. "If one lays one's hands on their eyes, and closes the lids, they feel a peculiar drowsiness, and presently pass into the deepest sleep, from which hardly any stimulus will arouse them. . . The cataleptic rigidity is general or partial, complete or incomplete, more or less fugitive. It disappears as soon as the patient wakes." It is evident that Lasègue had by his manipulations produced a condition of the system similar to, if not identical with, well-known forms of hypnotism. "Two men passed into the state of cataleptic rigidity, as soon as any one closed their eyes. One fell into the deepest somnolence, the other did not sleep." Both died, but no morbid appearances were discovered. ('Biennial Retrospect' for 1865-6, New Syd. Soc., p. 119.)

SECTION III.—Loss of Muscular Power: Paralysis.

In the last section we have seen the influence of the emotions in causing irritation of the sensori-motor centres, and the motor

nerves, marked by the external signs of convulsive action of the muscles; in the present section we have to consider the effects of the same influence when it causes loss of function, indicated by muscular paralysis.

"Violent emotions of the mind" were enumerated by Aretæus among the causes of paralysis, and most medical writers have referred to them when treating of the etiology of this disease, or rather symptom of disease. They have not, however, always discriminated between the different pathological conditions which may accompany emotional paralysis. It is evident, however, that these conditions widely vary — that in some cases there is what is ordinarily understood as a functional derangement, merely, of the motor centres, while in others, palpable organic changes take place, as when the rupture of a vessel occurs from the vascular excitement induced; and, again, the motor centres may be only apparently or secondarily affected, as in many cases of hysteria, in which the Will itself, a function of the hemispheres, is at fault. I am far from thinking, however, that in all cases of so-called hysterical paralysis, the Will is paralysed or suspended. On the contrary, I believe the motor centres and nerves are frequently enfeebled by the abnormal play of emotion upon them, and that they are for a time really unable to respond to, at least, ordinary stimuli. An emotion may also be conceived to cause structural change in the higher centres of the encephalon, and in this way induce paralysis by a sympathetic influence.

We may here refer to Brown-Séquard's well-known opinion that hemiplegia may result from a special influence exerted by one part of the brain upon another, not by the former's loss of function, nor by its pressure on the latter. Thus, the irritation of certain fibres of one region may, by acting upon the motor centre, alter its nutrition, and so cause paralysis of a limb. In order to satisfy "our craving for explanations," Brown-Séquard suggests that the irritation is in these cases transmitted through nerve-fibres to some cells at the base of the brain, and from them reflected upon the neighbouring blood-vessels by means of other nerve-fibres. (xlvii, July 20, 1861.)

Dr. Jackson's explanation of the effect of disease of a portion of the hemispheres upon the motor tract, consists in supposing

that it induces disorder of the circulation in an arterial region, which includes the corpus striatum. That in this way the higher often affect injuriously the lower centres would seem highly probable.

It is easy to understand how, from Fright or sudden Joy, there may be a shock, more or less temporary, to the motor centres by which some part is rendered unable to respond to the stimulus of the Will, or of ideas, or emotions, just as a man is sometimes deaf for days after firing a cannon, or is for a time blind after his eyes have been subjected to intense light. The Will, however healthy, is as powerless to stimulate the nerves of motion as is galvanism to excite a frog's nerve poisoned by woorara.

In considering the changes which occur in the tissue of the brain and the vessels, the frequently felt difficulty of determining their order of sequence arises; but certainly when, from an overwhelming mental shock, a man becomes paralysed, whether in speech or limb, it seems most natural to conclude that, as mind is the function of brain, the first event in the series is a change in the normal condition—the molecular arrangement—of some portion of the brain-tissue, which is transmitted simultaneously to the conductors of voluntary motor power, producing transient or permanent effects, according to its force and the weakness or proclivities of the part upon which it falls, and to the vaso-motor nerves, causing sudden vascular changes in the brain which interfere with its nutrition. So, in two ways, mental shock causes paralysis; directly, through the voluntary motor fibres, and, indirectly, through the vaso-motor nerves. These changes are severally indicated by outward signs of muscular paralysis, and altered vascularity and nutrition.

Frequently, then, as vascular changes, occasioned by Emotion, may cause the morbid condition of the nervous tissue which entails paralysis, it seems very probable that a mental shock may directly produce molecular changes in the brain and motor system, independently of those which arise from congestion, anæmia, or rupture of a blood-vessel. Handfield Jones has done much to demonstrate the possibility of exhaustion of the nervous centres without appreciable physical

change. Violent emotion may well cause what he calls primary paresis of ganglion-cells in the encephalic, spinal, or sympathetic nerve-centres. It is worthy of notice that at the moment of shock, at the very instant when there is paresis of the voluntary nerves, the sympathetic must be in an opposite condition, as indicated by the pallor of the face.

In regard to the vascular changes occasioned by emotional excitement, we are ourselves conscious of the rapid alterations which take place in the circulation in the brain—the rush, the throbbing, the vertigo, the tinnitus aurium, &c. That the brain tissue should suffer, and paralysis should supervene, in a certain proportion of cases (those in which the cerebral vessels are weak or diseased), is natural enough. We cannot, therefore, doubt that emotional paralysis is not unfrequently due to extravasation, as well as the opposite condition of deprival, of blood. This disturbance of the cerebral circulation may doubtless arise, either indirectly from the increased force and frequency of the heart's pulsations, or directly from the influence exerted by the emotions on the vessels of the brain.

Further, emotional paralysis may probably be sometimes referred to the morbid influence which mental shock is capable of exerting over the quality of the blood; altered blood being able to modify the functions of the nervous centres, and produce the effects which more usually proceed from primary disorder of the encephalon itself.

General loss of muscular power—not what is generally understood by actual palsy—as the result of emotional shock, is well illustrated by a reference to the sad scenes in Ireland during the Revival, from which we drew such striking examples of convulsion. We are told that "a great number were smitten down suddenly, and fell as nerveless and paralysed and powerless, as if killed instantly by a gunshot." A girl, æt. 14, while singing, fell down instantly, deprived of speech and sight, "the mind as active as ever." This occurred in the evening; in the night she slept three hours and awoke in the same condition, and remained so till the next day—eighteen hours altogether—when she regained her voice and sight as suddenly as she had lost them. Medical remedies had been tried, but without effect;

mental impressions, similar to those which caused, cured the malady.

A very ancient synonym for paralysis—aphonia—indicates the frequency of impairment or loss of power over the vocal organs in this affection. Paralysis of emotional origin is, indeed, most frequently seen in connection with loss or impairment of speech. Of course, this symptom may be associated with widely different conditions of the nervous system—with lingual paralysis, paralysis of the laryngeal muscles, or with inability to recall words, &c.

Speechlessness, in short, may result from disorder (loss of function) of the grey matter of the convolutions, the fibres which connect them with the sensori-motor ganglia, these ganglia themselves, or the motor nerves, proceeding thence to the muscles employed in speech.

Thus it is clear that a violent emotion may so affect the intelligence that, although a person can move his muscles, he no longer has the right idea at hand to communicate, and is speechless in consequence; there being, in fact, no motor paralysis. Again, he may have ideas, and may be unable to communicate them by vocal signs—by speech—this condition arising from a break in some of the fibres passing from the convolutions to the motor centres, which prevents the Will being transmitted* to the central ganglia, or, as is more probably the case, from such a change in the motor centres that the nerves supplying the muscles engaged in speech, those, namely, of vocalisation and articulation, are paralysed. The disturbing influence already referred to, of a part of the brain, the function of which is not motor, upon one which is, admits of application here. "Loss of speech," says Brown-Séquard, "is a symptom induced more frequently than any other by a sympathetic influence from the cerebral lobes upon the base of the brain" (xlvii, loc. cit.)

Mild and transitory forms of speechlessness are familiar to all, and may not deserve the name of paralysis, but they

* Or the fitting word re-called—the "motor intuition," Dr. Maudsley would say, associated with a certain idea organised in the motor centres of speech by education. See his able paper "Concerning Aphasia," in the 'Journal of Mental Science,' January, 1869.

indicate the initial stage. The Virgilian "vox faucibus hæsit" occurs to every one, and Shakespeare's description of Collatine is a perfect description of the influence now referred to.

> "The deep *vexation* of his inward soul
> *Hath served a dumb arrest upon his tongue;*
> Who mad, that sorrow should his use control,
> Or keep him from heart-easing words so long,
> Begins to talk; but through his lips do throng
> Weak words, so thick come, in his poor heart's aid
> That no man could distinguish what he said."

Of Sir Philip Francis ('Junius') it is said in his biography, "Indignation would at times master his utterance. For betrayed confidence or violated friendship he had burning words of reprehension on paper; but his spoken comment scarcely got beyond a single word, muttered as if to himself, with clenched hand and knitted brow. 'Base, base! He, too, the hound!' . . . . Without the aid of tone or gesture, he must often have been misunderstood" (xiii, II, p. 395). Recurring here to the remarks formerly made in regard to the purposive character of emotional acts, it might be objected in these cases, that this very association of the emotions with important muscular movements is an actual disadvantage. Is not the utterance constantly choked thereby, just when we most desire to express ourselves? It may be replied, that inarticulate utterances, rendered so by emotion, are themselves more effective than the best chosen words. A striking proof of this is given in Sir P. Francis's own description of the eloquence of Fox. "Panegyric," he says, "was not his forte, and when he attempted it, it was none the better for preparation. A few words of sorrow or applause, coming of themselves in the course or agitation of some other question, and starting from it as if they had escaped him; a breathless pause, a broken sentence, and then a rapid return to his subject, as if for an instant relief, could not but have made a deep impression on any audience. *For who can resist the inarticulate sorrows of a wounded heart?* His eulogy of Francis, Duke of Bedford, seemed to me a performance very unequal to the subject and to the speaker. I am sure it made little impression, and the less because it was the result of pains, and accompanied with an emphatic delivery.

Had he unexpectedly heard of the duke's death while he was speaking in the House, and sudden grief had made its way in a natural, unpremeditated burst of passion, which alone can be pathetic, I think he would have succeeded much better, even, possibly, enough to touch the androgynous heart of William Pitt. . . . . If in a transport of grief his voice had failed him, *or his speech had ended abruptly*, there were but few men, even in the House of Commons, callous enough not to have been affected by the subject, the actor, and the scene."

When men are struck dumb by Terror or mental excitement of any kind, the pathological condition may, as we have said, vary, but usually we may infer there has been a shock to the motor centres, involving temporary paresis of the nuclei of the nerves supplying the muscles concerned in either articulation or vocalisation, or in both. These nerves no longer respond to volition, but gesture-language and writing remain. A case lately occurred at Aldershot, which illustrates the effect produced by passion; the passion of a man which, levelled at another, recoiled upon himself. It is reported by Major Miller, the Governor of the Military Prison there:—"One of our prisoners, on being checked at drill by one of the warders, wished that 'God Almighty would strike the warder dumb.' The prisoner was struck dumb on the spot, and did not recover his speech for seven days. During the period he was deprived of speech, he was strictly watched. There was no feigning whatever; the man was most wretched and alarmed." ('Good Words,' Sept., 1870.) Dr. Handfield Jones gives from 'Casper's Wochenschrift,' 1848, the case of a sailor, witnessed by Paulini, when surgeon on board a vessel. A violent storm arose, threatening immediate destruction to all the crew. One of them, a healthy Dane, æt. 30, of fair complexion and light hair, was so terrified that he fell speechless on the deck. Sanguineous perspiration followed, and from this point of view the case has a special interest, to which we shall again refer. It is sufficient to add here, that as this symptom disappeared the power of speech returned, and the sailor was perfectly well after the storm had passed away.

In three cases—the Revival girl, the soldier, and the sailor—a powerful emotion produced concussion of the motor centre

concerned in the expression of ideas by the muscles employed in speech. There was no power of articulation, but there is no reason to suppose they could not have expressed themselves by gestures or by writing.

Dr. Todd's 'Clinical Lectures on Paralysis' contain a definite reference to emotional paralysis, as observed in men of hypochondriacal habits, and in women. He remarks that "it most commonly consists in a simple loss of speech, occurring under some strong excitement, the power of speaking returning usually in a few days, and indeed generally very rapidly after the patient has regained the ability to pronounce one or two words, such as 'yes' and 'no.'"

The case which Dr. Todd gives by way of illustration is as follows:

"The patient was a man between 50 and 60 years of age, of irritable temper and hypochondriacal habit. A question, respecting some very trifling matter, happening to arise one evening in his family party, some one present held out too strongly against his views, and this led to a vehement contradiction on his part, which was met by a counter-statement and a rejoinder, and thus he became excited to such a degree that his power of speech completely abandoned him. . . . The patient had full use of his muscles; he had full power over his hands and feet; he could sign a cheque, and his mental faculties seemed unaffected; only he could not speak, and whenever he tried to do so, the attempt would end in a fit of crying. He continued in this speechless state for about a week, when he recovered, and when once he began, the power of speech returned fully in a very short time. Two years after this occurrence the same gentleman got into a similar argument and difference of opinion upon a matter equally trivial, and became again strongly excited; but this time, instead of becoming speechless, he became hemiplegic on the left side, without mental affection, but with decided palsy of the left side of the face. The paralysis was not complete, for he could move the fingers and leg very slightly. After a little time, without any other treatment than that of removing, so far as possible, all exciting causes, he recovered to a great extent the power over the arm and leg; but although the principal recovery took place

about six weeks after the attack, he is now, four months after the occurrence of the hemiplegia, by no means quite well" (lxxiii, p. 283).

Dr. Todd adds that, as he had never examined the brain of patients suffering in this way, he could not say how far there had been lesion, but he thought it must be slight, if any, and resemble that occurring in the transient hemiplegia which follows epileptic seizures. In these cases he discards the vulgar and convenient explanation of congestion, believing that the vessels only play a secondary part in the production of such functional derangement. Hyperæmia is only an effect of a morbid condition of the brain-tissue, or of the blood, or of its circulating force. In emotional paralysis, according to this view, the polarity of a certain portion of the brain is disturbed —exalted—and is immediately followed by exhaustion, as excessive muscular action exhausts and depresses the muscular force. This condition, if prolonged, may by the arrest of nutrition involve softening; but it is the transient form to which this explanation has more especial reference. In this case, however, judging from the subsequent attack, it seems probable that the first seizure was not an example of mere nervous shock, as in the previous cases, but of some vascular change. Indeed, from the "trifling" character of the exciting cause, it may be inferred that the brain was already disordered, and on the brink of changes involving paralysis.

Dr. Lavirotte attributes, in the following case, the invasion of paralysis to Anger; but he thinks also that it *may* have been only a symptom. The muscles generally, including those of articulation, were paralysed, but the patient's intelligence was unaffected.

Françoise Classin, aged 28, possessing a strong constitution and married. Two years ago she had a violent altercation with her husband, and being herself in a great passion, she lost her speech. She became unable to walk or support herself, or eat without assistance. At the end of six months her speech had gradually returned, and she could walk a little and grasp large objects. She has subsequently recovered some power over her muscles, but has great difficulty in turning over the pages of a book, and in walking she is obliged to seek some support.

She has never experienced any pain; with the exception of amenorrhœa, the bodily functions are healthy (xxxv, 1859, p. 451).

A different class of cases—those in which only the vocal cords are (functionally) paralysed, the tongue, lips, and palate remaining unaffected (as also the intelligence)—is illustrated by a case Mr. Skey mentions in his 'Lectures on some Medical Subjects' (xlv, Sept. 22nd, 1866). It affords a good example of aphonia of emotional origin, in an hysterical subject.

"The subject," he says, "was a young lady of about 20, of pale complexion, and having cold hands and feet. Whilst I was engaged in conversation relative to her health, I somewhat imprudently remarked that a mouse was running about under the table at the end of the room. She uttered an exclamation of alarm, and in an instant so entirely lost the power of audible speech, that I was obliged to approach her and to put my ear close, to hear her. The ferocious cause of the mischief having paid the penalty of its intrusion by the loss of all it possessed on earth, the lady, in the course of an hour, recovered her voice. Had this person been in sound and vigorous health, she would probably have sustained the shock to her nervous system with less derangement of it. The case is interesting, as showing the sudden influence of the mind on a particular nerve in the general system."

Evidence to the same effect may be adduced from the French Commission on Animal Magnetism (1784). They report—"We have seen the Imagination, when sufficiently excited, powerful enough to cause loss of speech in an instant." This is exactly analogous to the effect produced, in some instances, by a too powerful galvanic current applied to the larynx.

Mr. Fletcher records a case of aphonia in a gentleman, caused by indulgence in solitary Grief, Fear, and Remorse:—"There was no other symptom but that of aphonia about him, besides general languor and despondency. His voice had been gone for five weeks. I held a long, cheering, and soothing conversation with this very stout and healthy person, during which he became satisfied that there was no return of a complaint, the thoughts of which weighed heavily on his mind. He was directed to rise early, take the air, enter society, and drink a

few glasses of wine after dinner. A week afterwards his voice had fully returned" (lxxiv, p. 327).

As a contrast to these cases of loss of power over the vocal muscles, take the following illustration of the influence of fright in causing serious cerebral mischief and "aphasia." I abridge from the 'Lancet' of Sept. 17th, 1870, the report of the case, which was under the care of Dr. Habershon.

The patient saw one of her children scald herself, and ran and caught her in her arms; then, having handed her to another person, immediately lay down, and from that time remained for three days motionless, unconscious, and without food. On admission at Guy's, three weeks after, she could say two or three words very imperfectly, her pupils were equal, her physical powers unimpaired. On being questioned, she indicated that she had great pain at the vertex of the head. Three days after, she appeared perfectly intelligent but replied to almost everything, sometimes with a little hesitation, "Yes'm;" sometimes, however, to a question requiring a negative reply, two or three times repeated, she succeeded in answering, "No, m'm;" and once or twice she, with great effort, and after some failures, expressed one of the first two or three numerals, but days, weeks, months, and years, were quite beyond her utterance, and after several despairing shakes of the head, a great effort would end in the almost invariable "Yes'm." She remained quite unable either to read or write. Five days after, the pain in the head was less severe; she could make almost any reply, requiring no more than two or three short words, but the interrogator was still addressed as "mum." She also read one or two short words correctly, and was able to write her name distinctly. When again seen, four days later, she was walking about the ward, apparently in perfect health. She still complained of pain at the top of the head, and though her vocabulary was limited, and her speech sometimes hesitating, she was in a fairly convalescent condition.

Dr. Hughlings Jackson informs me that he has not met with any evidence to prove that emotional disturbances produce aphasia. It occasionally happens, he admits, that after fright, anxiety, &c., the patient does not *talk*, but these cases, whatever their explanation may be, are not, according to him, cases which

can be properly called aphasic. At any rate, they differ very much, clinically, from cases of aphasia produced by a structural lesion. He does not believe that such one-sided symptoms as hemichorea, hemiplegia, &c., are ever *solely* caused by emotional disturbances. Hemichorea very frequently *follows* fright, but Dr. Jackson holds that there must of necessity be some local change in the central nervous system, or the symptoms developed by fright would not be one-sided. Possibly the normal structural difference in the two hemispheres may render one *more* likely to give way under the influence of a *general* bodily disturbance such as fright. (Mr. Callender has brought forward evidence to show that lesions of the right hemisphere are more likely to produce convulsion than lesions of the left hemisphere). But if so, this is the exception proving the rule; it is only substituting a physiological for a pathological difference. The symptoms which Dr. Jackson believes may be attributed to emotional disturbance are—1st, such as nervousness, depression of spirits, and sleeplessness; 2nd, such as loss of voice and tetanus-like convulsion (so called hysterical tetanus). As to the last two symptoms, he remarks that they show that parts of the central nervous system are affected which superintend movements largely involuntary.

Under the head of "Emotional Paralysis," is the report of a case in the 'Lancet,' Aug. 11th, 1860, by Dr. Wiblen, and although the employment of the term here is perhaps open to criticism, the case is not without interest, and, undoubtedly, the immediately exciting cause was emotional:—

"A gentleman, after being exceedingly desponding for ten days, and attaching more importance than usual to ordinary affairs of business, became on the 4th of July, much excited in connection with a very trivial occurrence. This excitement was followed by entire inability to speak, and by facial paralysis. During the following night his condition was comatose, and on the next day, when a slate was given him, "he wrote ciphers perfectly unintelligible, but in the course of a few hours was able to express himself in writing. During this interval he was seized with several paroxysms of sobbing and crying, after which he again fell into a comatose condition, from which, however, he could at times be readily aroused." On the third day he was

able to say "yes" and "no." From the 10th to the 20th of July he progressed slowly but satisfactorily, and was able to converse with tolerable distinctness. With the exception of slight loss of motion and sensation of the right angle of the mouth, and deviation of the tongue, he had recovered at the time of the report. Dr. Wiblen ascribes the symptoms to slight pressure or structural change at the origin, or in the course of, the lingual and glosso-pharyngeal nerves, but the higher centres appear to have been also involved.

The defect in this case, viewed from our present standpoint, lies in the absence of any apparent cause for the despondency. This depression of mind appears to have been itself a symptom of, and caused by, some cerebral mischief. It is true that some irritation in business occurred just prior to the attack, but it is expressly stated that it was trivial. The emotional condition and the paralytic seizure were alike the results of an abnormal condition of the brain. Still, the case is valuable, not only because the exciting cause of the paralysis was an impression on the mind, but because emotional disturbance (originating *ab intra*) preceded the motor affection. The tendency of morbid emotional states, whether arising originally from within or from without, to pass on and affect the motor ganglia, is exhibited in this case.

Since the above was written, Dr. Wiblen has kindly sent me a short report of the subsequent history of this case. In reply to my inquiry whether the despondency could be traced to a sufficient cause, he says (Nov. 5th, 1870), "the patient was in very good circumstances, and had no reason to be otherwise than most happy," a fact which confirms the foregoing remarks in regard to the primary cerebral origin of the patient's mental condition. This is further borne out by the sequel of the case, which proved to be of no merely functional and transitory character. "It went," he states, "from bad to worse, and the patient died about two years afterwards. He had all the same symptoms as described in the 'Lancet,' up to the time of his death. He was a very careful man as to mode of living. His grey convolutions were drilled with small cavities." He adds that he has seen two other cases since—both died—and that the late town-crier of Southampton was in a similar condition.

I am able to add, through the kindness of Dr. Lockhart Clarke, a report of his examination of the brain. The pia mater generally was very much thickened. The grey substance of the convolutions had an unusually pink colour. On the *right* side from behind forward, through the posterior and middle lobes, nothing more unusual was observed until reaching the optic thalamus. At the deeper part of this body and in the cerebral substance, on its outer side, there was a great deal of red softening. Patches of red softening were also found at the anterior part of the corpus striatum. On the *left* side of the brain there was found, in the middle of the optic thalamus, a cavity or cyst about the size of a pea, and containing a yellowish fluid outside the thalamus; the cerebral substance was softened, reddish-black in colour, and infiltrated with fluid, which, under the microscope, was found to be loaded with exudation or compound granular corpuscles. The cerebral matter itself contained these bodies in abundance, besides a vast number of molecular particles. In the central white substance of the cerebellum, around the corpus dentatum on each side, there were two or three small cysts. One of them contained a perfectly milky fluid which consisted of fat and oil particles. The medulla oblongata was softened and unhealthy along the fourth ventricle. Nothing remarkable was found in the spinal cord.

In the 'Lancet,' February, 1871, is reported a case of "Facial Paralysis from Fright," under the care of Dr. Wiltshire in the West London Hospital—

"The patient was an intelligent little girl, aged 5 years. Four days previously she had been much frightened during her mother's absence from home. On the following morning, the mother noticed that the child's mouth was drawn to the right side, and thinking that she was playing with her mouth, scolded her; but it soon became evident that the distortion was not voluntary. On admission it was found that, when the face was at rest, the paralysis was not betrayed, but during crying or laughing, the mouth was considerably drawn over to the right side. The left eye watered considerably; it could not be closed. There was no ptosis, nor were there any decayed teeth, enlarged glands, or evidence of the existence of worms. There was no otorrhœa or other symptom of disease of the temporal bone, nor

squinting, nor paralysis of any other part of the body. The child was rather restless during sleep. A grain of bromide of potassium was ordered to be given three times a day; and thirteen days after admission the following note was taken:—'Has slept much better since taking the medicine. There is decidedly less paralysis. The left eye discharges a good deal, but is not inflamed.' On the thirty-second day it was noted that there was scarcely any evidence of paralysis remaining; 'in fact, the only sign is a slightly quicker and more complete blinking of the right eye than the left when one pretends to give the child a blow in the face.' On the forty-sixth day the child ceased to attend.

"Three months after, the child was brought again to the hospital suffering from scarlatinal dropsy. It was ascertained that she had had no return of the paralysis, and presented no trace of it. No form of electricity was employed; the treatment consisted solely in the administration of bromide of potassium in three grain doses—a therapeutic agent to which Dr. Wiltshire thinks the recovery can hardly be attributed."

I have not met with any other good instances of the influence of emotional excitement on the *portio dura* of the seventh, but Dr. A. J. Sutherland states that "paralysis of the seventh nerve is a well-marked symptom of disease of the brain from severe mental shock," and I observe the remark in Romberg, that "violent mental emotions have, in some instances, preceded its occurrence," and he refers to Joseph Frank in confirmation ('Prax. Medic. Univer. Precepta,' 2nd edit. vol. i, p. 556).

A case of ptosis from grief is recorded by Dr. Sutherland. "Sudden shocks, as is well known, cause local paralysis; thus ptosis of both eyelids was produced in a patient of mine, when she heard of the intended marriage of a gentleman to whom she was engaged, under more than usually painful circumstances; the ptosis of the eyelids soon disappeared, but the symptom was followed by an attack of melancholia, with a strong suicidal tendency" (lxxi, p. 120).

Hemiplegia.—A case from Dr. Todd has already been given in connection with the loss of speech. Many cases of hysterical hemiplegia are clearly of emotional origin. Dr. Todd considered absence of face and tongue palsy characteristic of this affection.

The case of a young woman, æt. 30, subject to hysteria, is cited by Tissot, from Hoffmann ('Opera omnia,' t. iii, p. 202, xxxv, 1865, p. 162). Terror suspended the uterine functions and caused, first, painful spasms of the limbs, and then hemiplegia of the right side; of what duration is not stated.

In the following case, under the care of Dr. Stewart, reported by Dr. H. Jones, hemiplegia was accompanied by impairment of speech :—

"Mr. ——, æt. 40–45, of gouty family and very nervous temperament, had long been subject to attacks resembling laryngitis. Just before his illness on this occasion, he had been in great anxiety on account of his wife's health; had been fatigued while nursing her, and with various cares. He had no renal disease. While going upstairs to his wife's bedroom, in advance of the medical attendants, he suddenly staggered, and would have fallen backward had he not been caught. He was now found to be quite hemiplegic on the right side, consciousness unimpaired, speech nearly lost, face very much distorted. He was put to bed, slept tolerably, and next morning when seen at 8 a.m., all symptoms of palsy had disappeared, but returned again after breakfast. *The paralysis ceased and recurred again several days in the same manner,* but he was always free from it in the morning. Some time after it ceased to recur, any nervous excitement or extra fatigue would reproduce the disorder in a greater or less degree. Shortly afterwards he was seized with complete aphonia, and the same has repeatedly occurred subsequently, but has twice been removed by galvanism. In the winter of 1861–62, he had a return of the paralytic symptoms, accompanied by rheumatic pains" (lxxi, p. 481).

Dr. Jones adds, that in the opinion of three eminent medical men, there existed no organic disease, and remarks that the paralysis is fairly attributable to the exhaustion of nerve power, the chief cause being great anxiety.

Marshall Hall records in his 'Practical Observations in Medicine,' that two cases of hemiplegia under his care at the time of writing, were induced by parental anxiety. In the 'Medical Times and Gazette,' May 23, 1868, there is a short report of a striking case of paralysis induced by Fear. It occurred at the Limerick Sessions, where two men were charged

with having assaulted a relation. "The prosecutor (Roche) summoned his own father as a witness. The mother of the prisoners, exasperated at the prospect of her sons being sent to prison on the evidence of her own relative, gave expression to her feelings in a malediction, praying that when the old man left the witness-box, he might be paralysed; and paralysed he was accordingly, and had to be taken to the hospital. Such miraculous illness not yielding readily to ordinary modes of treatment, the old lady has been requested to remove her curse by spitting on the patient; but this she sternly refuses to do, and the man remains in the hospital."

Of the prognosis of emotional hemiplegia Dr. Todd remarks that although it promises ultimate recovery, it is often very slow.

Paraplegia.—Dr. Brierre de Boismont adds to a case illustrative of mental action upon the liver and stomach, one which similarly illustrates the effect produced upon the motor system:—

"A little peasant girl, Lucia Marini, eight years old, was separated for some time from her mother, a patient in the hospital. She had often begged to be taken to see her mother, but her relations, thinking it only "caprice," always refused. The child often repaired to the church to pour out her grief, and was one day found at the foot of the altar, sobbing and almost deprived of consciousness. Shortly after appeared symptoms of an affection of the cerebro-spinal axis, delirium, headache, and inability to stand. Leeches were applied to the head, and a seton inserted in the neck. This treatment relieved these symptoms, except the paraplegia, and on account of this she was removed to the hospital. Scarcely was she in her bed, than she begged again with tears ("caprice"!) to see and embrace her mother. The doctor (kinder, as is so often the case, than the friends of the patient) immediately ordered her request to be granted. Carried in the arms of the nurse to her mother's bed, she threw herself upon her neck, covered her with tears, earnestly inquired after her health, and seemed as if she could not caress her enough. After awhile she was requested to leave her mother and return to her bed. On their attempting to carry her, she sprang to her feet and cried out

with delight that she had recovered the use of them. She regained her bed without effort or fatigue. During the time, about ten days, that she remained in the hospital, no unfavourable symptoms returned, and she occupied herself in assiduously waiting upon her mother" (xxxv, 1853, p. 537).

Another illustration of paralysis resulting from mental emotion may be found in Hoffmann (loc. cit.).

In this case the vicious conduct of a young man was discovered by his father, and the chagrin of the former caused paraplegia, which proved incurable.

The nerves that control micturition are, so far as the *sphincter vesicæ* is concerned, subject, as is well known, to temporary paralysis from emotional causes, but I have no case sufficiently well marked to put on record. When the vesical muscle is itself paralysed, the non-striated fibres and the sympathetic are involved, and will be referred to in a subsequent section. The same remarks apply to the rectum and its sphincter.

Having now completed the survey of the influence of the emotions in the range of the motor nerves which supply the voluntary muscles, we proceed to pursue the same inquiry in regard to those muscles over which the Will has no power—the non-striated muscles and the heart. Here also we might examine the phenomena according as they assume the form of simple contraction, spasm, or paralysis, but we shall only refer incidentally to these states.

CHAPTER IX.

INFLUENCE OF THE EMOTIONS UPON THE INVOLUNTARY MUSCLES.

The Emotions act upon the Heart and non-striated muscles with a power similar to that which they exercise over the voluntary or striated muscles; causing contraction, spasm, and paralysis.

Hitherto we have as far as possible restricted our attention to the movements caused by the action of the emotions upon the muscles over which the will *can* exert more or less control, whether muscles of a purely voluntary or of a mixed character, all these being striated, and supplied by nerves undoubtedly derived from, and forming an essential part of the cerebro-spinal system. From the compound character of some *acts*, as Respiration, it is impossible to avoid their consideration, in both categories of muscular fibre, the voluntary and the involuntary. This must not, however, be allowed to obscure the important facts, that while all muscles are liable to be influenced by the emotions, only some can be influenced by the Will; and that these derive their nervous influence from cerebro-spinal nerves, while those which respond to emotional, but not to volitional stimuli, derive theirs chiefly, if not entirely, from the sympathetic. Claude Bernard, indeed, refuses to admit the distinction indicated by these terms, and says they ought to be expunged from the vocabulary of science; but it is sufficient to reply, in justification of retaining them, that (as he admits) the sympathetic ganglia enjoy certain special powers, that although the sympathetic nerves arise from the spinal cord (including the medulla) microscopists believe them to be derived from a distinct order of cells, that he himself cannot escape the distinctive use

of the word against which he protests, and allows that "it is highly probable that in the difficult and complicated study of the nervous system, we meet *with two distinct orders of nerves*; the vessels are placed under the influence of the first, while the histological elements obey the power of the second; nutrition depends on the former, and physiological activity is aroused by the latter." Although he adds, that "the sympathetic nerve may therefore be viewed as a complementary apparatus placed by the side of the cerebro-spinal system," and refers the different results of excitement of the two, to the different nature of the elements on which their action is exerted, there is sufficient reason, we think, for continuing to use these well understood terms, while not denying the spinal origin of the sympathetic.

Passing then from the voluntary muscles, we proceed to consider the influence of the emotions upon the heart and non-striated muscles.

The Heart.—The influence of the emotions upon this organ is so remarkable, that it has always been a problem of great interest to determine the nature of their relation; and to ascertain from anatomical facts, why it is that the feelings and the heart are, and always have been, so inseparably connected. The heart, it need hardly be said, is a most prolific source of figurative modes of speech. Indeed the fact from which this arises, that of the heart being regarded by mankind as the organ of the passions, is itself an indication of the intimate relation subsisting between certain states of the mind* and the movements and sensations of this viscus. "Heart-rending" descriptions, "cordial" expressions of good-will, and numberless cognate terms

* Lactantius, in making some acute remarks on the state of the mind in ecstasy, in his treatise 'On the Workmanship of God, or the Formation of Man,' says, "The mind which exercises control over the body, appears to be placed in the highest part of the head, as God is in heaven; but when it is engaged in any reflection, it appears to pass *to the breast*, and, as it were, to withdraw to some secret recess, that it may elicit and draw forth counsel, as it were, from a hidden treasury. And, therefore, when we are intent upon reflection, and when the mind, being occupied, has withdrawn itself to the inner depth, we are accustomed neither to hear the things which sound about us, nor to see the things which stand in our way. But whether this is the case, it is assuredly a matter of admiration how this takes place, since there is no passage from the brain to the breast. But if it is not so, nevertheless it is no less a matter of admiration that, by some Divine plan or other, it is caused that it appear to be so."

at once occur to the mind. Elihu said "at this also my heart trembleth and is moved out of his place." Dr. Johnson's commentary is "The heart is considered as the seat of tenderness: a hard *heart* therefore is cruelty." "Lorsque Dieu" says Bossuet "forma le cœur et les entrailles de l'homme, il y mit premièrement, la *bonté* comme le propre caractère de la nature divine."

Gesture-language is equally significant, whether in the wild Indian who expresses fear "by putting the hands to the lower ribs, and showing how the heart flutters and seems to rise to the throat" (Tylor), or in the civilized white man who "lays his hand upon his heart" when he desires to emphasize the force of the gesture under which he labours.

It is not surprising that men should wonder how this comes to pass, if what the physiologist tells them is true, that the feelings which they associate with the heart are really seated in the brain.

> "But since the *brain* doth lodge the powers of sense,
> How makes it in the *heart* those passions spring?"

The poet's reply—

> "The mutual love, the kind intelligence
> 'Twixt heart and brain, this sympathy doth bring;"

if vague, is scarcely more so than what we find in some medical works. Burdach, writing in 1726, observes "'it is said I love you with all my heart,' 'this tears my heart,' &c.; not because those sentiments are produced in the heart, but because in every violent affection, either the heart or other parts, by the movements of which we describe the affections, in our language, act *sympathetically*. ('Meditationes de Animâ Humanâ,' cap. vii. p. 198. xxii, II, p. 75.) But Burdach was opposing the vulgar error that the heart is itself the seat of the passions. Plato had placed one of his three faculties of the mind— the irascible—in the heart, and Aristotle had made it the seat of the soul, and the origin of the nerves. Others followed in the same direction. It is remarkable that while Unzer and Prochaska entirely avoided this error, later physiologists like Virey should have returned to the old and vulgar idea. "See," says Bichat, consistently with his location of the Passions in organic life, "see the man who is agitated by anger or fury; his muscular powers doubled,

nay trebled, exert a force which he cannot even check. Whence this increased power? Manifestly the source is in the heart" (li, p. 46). In Fear, on the other hand, the heart, also the starting point, sends less blood than usual to the brain, and causes feeble action of the voluntary muscles and syncope. Unzer, when treating of grief and fear, observes "an irregular influence of the vital spirits on the nerves of the heart, renders its movements at one time excessive, at another enfeebles them even to syncope" (i, p. 170). He clearly does not locate the emotions in the heart. Virèy, after observing that "According to Prochaska, the passions act on the heart by means of the nerves of the eighth pair," adds "but may it not be maintained, on the contrary, that the emotions of the heart *ascend* to the brain by these same nervous branches? For Vauvenargues said with reason, *great thoughts come from the heart.*" . . "Instinct is innate in the breast; it emanates from within the internal organs of life; *it acts without the concurrence of the brain.*" Gall, who cites these passages only to indignantly refute them, replies "the organ which produces an affection or a passion is, in fact, confounded with the viscera on which this affection or this passion acts. The nervous system of the chest, the abdomen, the spinal marrow, of the senses, of the brain, are put in communication by nervous branches, in order that they may act reciprocally upon each other" (xxii, II, p. 76).

Gall as strongly combated the notion with which these views were closely connected, that the ganglia of the sympathetic are themselves the seat of the passions, and justly asserted that "emotion being felt in certain parts, in connection with the affections and passions, proves nothing as to their seat."

It is not necessary to repeat the observations already made discarding any hypothesis in regard to the localisation of the passions, which does not refer their seat to the encephalon—employing this term in its most comprehensive sense. Their ideational element is as clearly referable to the hemispheres, whatever probability may attach to the view that the emotional element is, in common with sensation, a function of one of the ganglia at the base of the brain, and in close relation with the medulla oblongata. The application of this view (or of any modification of this view, such as the restriction of it to the

localisation of the centre of emotional movements in the medulla) to emotional disturbance of the heart and lungs, is obvious. "When a violent and sudden emotion causes death, it is in acting on the medulla oblongata that it has such a powerful effect" (Brown Séquard; lix, p. 226). It only remains to inquire here, through what nerves do the emotions influence the heart?

As this organ is supplied by nerves from the pneumogastric and the sympathetic, and as it is impossible to make satisfactory experiments upon these nerves in connection with the transmission of purely emotional influences, the first question to be determined is the effect produced upon the heart by irritation and division of these nerves. Here, unfortunately, we are met by so much contradictory evidence that it really seems hopeless to arrive at any definite conclusion. Let us, however, glance at the facts brought forward, and endeavour to elicit the main truth.

Claude Bernard says that division of the pneumogastrics disturbs the heart's motions, and produces coagulation of blood in its cavities (lxviii, 1872). Weber found that it arrests the movements of the heart, and that the same effect is produced by an electric current transmitted through these nerves, divided at their origin—the organ being relaxed ('Syd. Soc. Year Book,' 1859). Mechanical irritation of these roots, according to Valentin and others, accelerates the heart's action. Schiff suggests this may be due to exciting the reflex centres of the sympathetic system contained in its substance.

Physiologists have been greatly divided in opinion as to the motor or sensory character of the pure and unadulterated vagus. M. V. Kempen asserts that it possesses motor fibres before the spinal accessory joins it. Dr. Jackson has pointed out that this is confirmed by, or at least is in accordance with, Lockhart Clarke's observations, that some of the fibres of the hypoglossal nerve appear to arise from the pneumogastric nucleus, just as they do from that of the spinal accessory (lxxvii. 1864).

So far, we see the evidence is in favour of the conclusion that the pneumogastrics, pure and simple, contain motor fibres, and that through the cardiac branches they affect the motion of the heart; but this does not destroy the evidence in favour of

sensory fibres also; the pneumogastric may therefore be a nerve of compound character from its origin.

With regard to the influence of the sympathetic, Weber found that stimuli conveyed through this nerve accelerate the movements of the heart. On the other hand, in a case quoted by Dr. Carpenter from 'Müller's Archives,' in which the heart's pulsations were occasionally checked for an interval of from four to six beats, its cessation giving rise to the most fearful anxiety, and to acute pain passing up the head from both sides of the chest, these symptoms were connected, as it proved on a post-mortem examination, with the pressure of an enlarged bronchial gland upon the great cardiac sympathetic nerve (viii, p. 475).

These and other facts leave no room to doubt that the sympathetic nerves are concerned in the motion of the heart, and the question is whether the emotions act through them or the pneumogastrics, or both, when accelerating or retarding the movements of this organ.

"It is difficult," as Dr. Carpenter observes, (loc. cit.) "to ascertain by experiment upon the lower animals, whether simple emotion, unattended with struggling or other exertion, would affect the pulsation of the heart after section of the pneumogastrics; but when the large proportion of the sympathetic nerves proceeding to this organ is considered, and when it is also remembered that irritation of the roots of the upper cervical nerves stimulates the action of the heart through these, we can scarcely doubt that both may serve as the channels of this influence, especially in such animals as the dog, in which the two freely inosculate in the neck."

In man, it will be remembered, there are at least three points of communication between the pneumogastric and the first or upper cervical ganglion and nerve; first, near the base of the cranium: this sympathetic ganglion is connected by small branches with the second ganglion of the pneumogastric; secondly, a branch joins the ganglion of the root of the pneumogastric; and thirdly, the upper cardiac nerve sends numerous branches to the pneumogastric.

Kirkes and Paget observe that the pneumogastric enters into so many anastomoses with the nerves of the sympathetic that

it is hard to say whether the filaments it contains are, from their origin, its own, or are derived from the latter, and they regard many of the filaments originating in its own ganglia as sympathetic in character, and conclude that its action on the heart "is, as its structure would suggest, like that of the sympathetic more than that of a cerebro-spinal nerve" (liii, pp. 499, 504).

This conclusion may seem to militate against the alleged inhibitory character of the pneumogastric, and certainly does, if we regard the cardiac nerves as acting in accordance with that antagonism supposed to exist, in the bodily organs and vessels, between the cerebro-spinal and sympathetic systems. If in the capillaries we have reason to believe that there are these two opposing nervous influences at work, the sympathetic contracting, and the cerebro-spinal force contending to bring about dilatation of their walls, it would seem probable that the central organ of circulation itself would form no exception to this principle.

Again, the opinion that the pure pneumogastric is a sympathetic nerve, which from some points of view seems highly probable, does not appear to be confirmed by more recent observations. Dr. A. Waller, in his Croonian Lecture, 1870, an abstract of which will be found in the 'Proceedings of the Royal Society,' May 12th, of that year, states that his experiments lead to the conclusion that the pure vagus, with its ganglion, corresponds to the posterior root of the spinal nerves, as held by Sir C. Bell, although some motor fibres seem to be mixed up with it. To separate the pneumogastric or vagus from the spinal accessory, Dr. Waller destroyed all the fibres of the latter, leaving those of the former intact. The pneumogastric was then galvanized at every part of its length, but it was found impossible to affect either the action of the heart or the stomach, the only result being to induce slight movements of the larynx. On the other hand, mechanical irritation applied over both the pneumogastric and sympathetic nerves in the neck, in man, caused oppression over the præcordia and more or less complete stoppage of the heart's action.

Let us now consider, in connection with the theory of the inhibitory action of the pneumogastric, the experiments of Professor Moleschott, of Zurich, and see how the emotion

might operate, if his conclusion, opposed to this alleged influence, be the true one.

He found that although most of the observations made by Weber, Wagner, Bernard, &c., could be repeated, and were not really inconsistent with his own, they did not prove the alleged distinctness of function between the vagi and the sympathetic. A slight stimulus of the former quickened the heart from 190 to 232 in the rabbit, and from 30 to 42 in the frog. The same occurred when the vagus was cut through and the peripheral end of the nerve was excited, showing that it is not merely a reflex phenomenon. If the stimulus of the vagus is continued, the pulsations of the heart are retarded, and ultimately are entirely arrested. As this is what would happen if the anterior roots of the spinal cord were similarly excited, Moleschott sees no reason for assigning an inhibitory function to the vagus. With regard to the alleged fact that section of the vagi and consequent paralysis cause frequency of the pulse, he found that the fact itself was not correctly stated, but that generally in rabbits the pulse was slower after section. It is only some time after the operation that frequency of pulse is observed, and this he attributes to the pressure of exudation. Further, he demonstrated that the direct galvanic current produces an increase, and the reverse current a diminution of the heart's action, as holds good when motor nerves are acted upon in the same way.

As to the sympathetic nerves of the heart, Moleschott's experiments demonstrated that the same phenomena occurred as in the case of the vagi, when excited mildly and strongly by galvanism, and he concluded that these two sets of nerves exercise the same influence upon this viscus.

It appears, therefore, fair to conclude that the emotions act upon the heart both through the vagi and the sympathetic. Their *modus operandi*—now accelerating, now arresting its action—would seem to derive illustration from these and similar experiments.

If we were to substitute Emotion for the stimulus applied by Moleschott to the nerves proceeding to the heart, we can well understand how the former should produce the various and opposite disturbances of this organ, including spasm and paralysis,

with which we are familiar. First, as a feeble or moderate stimulus of the vagus (whether electric or otherwise) causes a considerable rise in the pulse, so does an emotion which is not excessive in character. Secondly, as an increased stimulus gradually retards the action of the heart, while a very powerful one immediately arrests it from the fatigue which succeeds stimulation, just so, we can well conceive, a violent emotion would act. Thirdly, the fatigue may be gradually recovered from, and the heart's action be restored to its normal frequency and force.

The ganglia of the heart appear to act in the way of communicating the condition of one of the four nerves supplying the organ to the other three. In regard to emotional stimuli, however, it seems impossible to decide whether one is more influenced than another, and in view of Professor Moleschott's experiments, it is evident that the emotions may act precisely in the same way, through either the vagi or sympathetic. We may be allowed to surmise that the ganglia and the fourfold supply of nerves to this organ are designed to lessen its liability to fatal paralysis and spasm by Emotion. "The heart," observes Moleschott, "is animated by four very excitable nerves, which may be easily over-excited; these four nerves, two vagi and two sympathetics, have a peculiar consensus, which is no doubt due to the action of the ganglia of the heart, so that the state of irritation or over-excitement which is produced in one of the nerves is transmitted to the three others; but it is not possible to exhaust permanently the other three by over-excitation of one nerve *singly*, as stimulants which would be powerful enough to effect this, would soon kill the excited portion of the one nerve, and therefore lose their effect upon the other three; such an effect being only possible as long as the nerve acted upon retains part, at least, of its excitability."*

This conclusion accords with the opinion of Kirkes and Paget, that the cardiac branches of the pneumogastric are one, though not the sole channel through which the influence of Emotion is transmitted to this organ, and with that of Dr.

* In the 'Medical Times and Gazette,' July 27, 1861, is a *résumé* of the professor's conclusions, from which the foregoing is derived.

Carpenter already cited; and it does not contradict the judgment expressed by him elsewhere, that the sympathetic constitutes the channel through which the passions produce palpitation of the heart, or Dr. Baly's statement that the disturbed action of the heart, during Emotion, is a remarkable instance of the influence of the passions over the movements of organs supplied by the sympathetic nerve; or, lastly, the forcible observation of Professor Laycock, that every stroke of the heart in emotion occurs under the same influence as that which secretes bile (lv, II, p. 388).

Since Moleschott's experiments, those of MM. Cyon and Ludwig indicate the existence of accelerator and depressor nerves of the heart, the former emerging from the cord with the third branch of the inferior cervical ganglion, and the latter arising (in rabbits) from the pneumogastric and superior laryngeal nerves. Bernard is stated to have adopted this view, and to hold that the heart, with this sensory depressor nerve, is able to regulate its volume, according to circumstances, by exerting a reflex action on the general circulation. Thus, too much blood in the heart excites (reflexly) the dilators of the capillaries and attracts the blood to the surface of the body. Too little blood in this organ, and consequent lessened sensibility allow, on the contrary, the contraction of vessels to exert their full unopposed force, and the blood regurgitates to the heart (*vide* Biennial Retrospect, N. S. S., 1869).

If the inhibitory view of the pneumogastric nerve be established, we must, in attempting to explain the injurious mode of action of certain emotional states upon the heart, suppose that the normal control which is constantly being exercised by this nerve, is, under excessive Emotion, so intensified by increased stimulation at its origin in the medulla oblongata, that the pulsations of the organ are partially or wholly arrested. A provision by which the heart is prevented sending more blood to an organ already too vascular from emotional excitement, may thus cause death.

It appears to the author, however, that so long as such wide differences of opinion exist among physiologists as to the functions of the nerves supplying the heart, we cannot speak

with any precision of the distinct modes of action by which the emotions influence this organ, but must be content with the general conclusion that they exert this influence, certainly through the acknowledged sympathetic, and probably through the pneumogastric by the reflex action which it may be supposed to exert when excited centrally by certain emotional states, just as it is alleged to do from the state of the heart at the periphery, or, if Moleschott's views be adopted, directly through motor fibres of this nerve.

Simple acceleration of the heart's action is the most frequent and obvious result of emotional excitement, and very little observation suffices to show that opposite emotions produce, in this respect, the same result. Thus Terror and Joy alike cause palpitation. It has been said that palpitation from the former is explained by supposing it to be the precursor of flight; but this explanation appears a doubtful one, and certainly does not help us to explain the increased beatings of the heart from Joy. When, however, we speak of the same result being produced by opposite emotions, we find, on closer examination, that this sameness applies to the frequency of the pulsations rather than to their character; that the palpitation of Joy is of the nature of increased vital action; that of Terror of simple irritation, and is no sign of power. It may, doubtless, be laid down as a general principle that pleasurable emotions increase the activity of the vital functions, and painful ones depress them. To this rule, the influence of these opposite emotions in causing increased frequency of the heart's pulsation offers no real exception. Terror induces an irritative frequency which, if continued, ends in cessation of the contractions of the organ; and Joy, if sudden, may be alike prejudicial. But take moderate and continuous Joy—a joyous frame of mind—and compare its effects with those of a permanently fearful or sorrowful state of the feelings, and the result will undoubtedly be in harmony with the foregoing principle. The real force and the regularity of the heart's beat will be increased under the former, and decreased under the latter condition. One of Hoffmann's aphorisms runs thus:—"Tristitia, cordis motum, et sanguinis circulum reddit languidiorem" (Opera, tom. i, p. 193). Irregular contraction of the heart from emotion, from slight

intermission to actual spasm, is a frequent circumstance. It arises sometimes from a particular cause, and is not excited by another, which appears to involve a more powerful emotion. Active anxiety or suspense has a special tendency to induce it. John Hunter says he was subject to "spasm of his vital parts" when anxious about any event—a circumstance of interest when his mode of death is remembered. "At my country-box I have bees which I am very fond of, and I was once anxious about their swarming, lest it should happen before I set off for town; this brought it on. The cats teaze me very much by destroying my tame pheasants, partridges, &c., and rooting up my plants. I saw a large cat sitting at the root of a tree, and was going into the house for a gun, when I became anxious lest she should get away before my return; this likewise brought on the spasm; other states when my mind is much more affected will not bring it on" (ii, I, p. 336). Hunter could tell an affecting story without experiencing any spasm; but it acted upon his power of articulation—he had to stop several times during its relation. Passion, as well as anxiety, affected his heart. "My life," he used to say, "is at the mercy of any scoundrel who chooses to put me in a passion."

The nerves supplying the heart may be so affected by emotion as to cause more violent contraction—tonic spasm—of the organ, which, from its occurrence in a vital part, is followed by death. Whether this results from muscular irritability taking place in consequence of the withdrawal of an antagonistic nerve force, or from the direct action of nerve force upon the muscle, it may be difficult to decide. Be this as it may, it seems clear, in cases of death like Hunter's, that the condition induced is one of spasmodic contraction of the walls of the heart. Let us refer to the record of his death and *post-mortem*. When the Governors of St. George's Hospital decided that no person should be admitted as a student without bringing certificates of having been educated in the profession (a regulation which appeared designed to exclude Hunter's countrymen), he advocated at the Board the admission of two young men, inadmissible under the new rule. His biographer, Mr. Palmer, states that, before the meeting, he expressed his apprehensions to a friend "lest some unpleasant dispute might occur, and his

conviction that, if it did, it would certainly prove fatal to him." "Arrived at the hospital he found the Board already assembled, and entering the room, presented the memorial of the young men, and proceeded to urge the propriety of their being admitted. In the course of his remarks he made some observation, which one of his colleagues thought it necessary instantly and flatly to contradict. Hunter immediately ceased speaking, retired from the table, and struggling to suppress the tumult of his passion, hurried into the adjoining room, which he had scarcely reached when, with a deep groan, he fell lifeless into the arms of Dr. Robertson, one of the physicians of the hospital, who chanced to be present. . . . Various attempts were made for upwards of an hour to restore animation, under the hope that the attack might prove to be a fainting fit, such as he had before experienced; but in vain; life had fled, and all their efforts proved useless." The *post-mortem* revealed a condition of the viscera such as might have been expected. The heart was found to be extensively diseased. It was small, appeared to have wasted, and was strongly contracted. On the left auricle and ventricle were two opaque white spots—the muscular tissue pale, and loose in texture. The coronary arteries were converted into long tubes, with difficulty cut across, and the mitral valves were much ossified. The aorta was somewhat dilated, and its valves thickened and wanting pliancy; the inner surface of the artery studded with opaque and elevated white spots. The pericardium was unusually thickened, and did not contain much fluid. The viscera of the abdomen and head were loaded with blood, and the carotid arteries within the skull, and their branches, were thickened and ossified (p. 132).

We have said that it is highly probable that, in such fatal cases as the foregoing, severe and persistent spasm of the heart is the cause of death. It seems equally probable, on the other hand, that the same fatal effect may follow from emotional excitement, inducing a very different condition of the muscular tissue of the heart. The organ ceases to contract upon its contents, and becomes dilated and powerless. These opposite conditions are seen in the voluntary muscles, and from like emotional causes; the hand being, in one case, rigidly con-

tracted, or, in another, paralysed; and the result only differing from that of cardiac spasm or paralysis, in the circumstance of the hand not being a vital organ.

Pettigrew quotes from Senac's 'Traité du Cœur' (tom. ii, p. 454), the case of "a person who being witness to a dreadful shipwreck, was so operated upon by distress and terror, that palpitation of the heart was succeeded by oppressed breathing and syncope, and death ensued. Upon examination, the heart was found enlarged."

Tissot asserts that dilatation of the heart and the aorta has been caused by Anger and Chagrin, and he refers for proof of the former to Bonnet, Morgagni, and others; and of the latter to Harvey, Zimmermann, &c. Bichat cites Desault's statement that diseases of the heart and aortic aneurisms are multiplied in revolutions, in proportion to the evils which they produce.

Speaking of intermittent pulse, Dr. Richardson observes, "I have never met with a case in which the disorder was not sequential to some anxiety, shock, fear, sorrow, or their similars. I have met with case upon case in which the sufferer has been able, from his own perception of the intermittency, to register the precise moment when the injury causing it was inflicted." (xxi, Oct. 1869).

It is not surprising that in the present day, when the worry of life and strain on the feelings in all ways, are so vastly intensified, that there should be strong evidence to show the increase of cardiac affections. From Dr. Quain's recent Lumleian Lectures, at the College of Physicians, on the Heart, we learn that "during the last twenty years, the total of deaths of males at all ages from heart-disease has increased in number from 5,746 in 1851, to 12,428 in 1870. The number of deaths from heart-disease, for 1000 of population living, was ·755 between the years 1851 and 1855; and it has risen to 1·085 from 1866 to 1870. This increase it must be observed, too, has taken place wholly in connection with the working years of active social life. There is no change in the number of deaths from this cause in males under 25 years of age. Between 20 and 45 years of age it has risen from ·553 to ·709, and that almost exclusively in males, for there is scarcely any increase in the percentage of females dying from heart-

disease during the twenty-five years of life from 21 to 45." (xxxii, March 23rd, 1872).

Whether twenty years hence, in the days of "The Coming Race," when the Gy-ei will have fully engaged in the arena of public life, they will enjoy the same comparative immunity, is rather more than doubtful.

The disturbance of the heart's action indicated by syncope is a common phenomenon as the sequence of emotional excitement, and it is easy to understand how in cases where the heart is healthy, nothing more serious may occur, but where it is diseased and has already quite enough work to perform, it succumbs to any strong or tumultuous passion. We find here, as in other instances, that similar results are produced by very opposite forms of emotion — Joy and Fear—both however agreeing in this, that they are sudden and intense.

Sudden Joy, indeed, appears to have as decided an influence as Fear or Grief. It might hardly have been supposed that if we take two persons and subject one to the operation of a depressing, the other to that of an exciting emotion, the former may remain calm and the latter faint away. Yet in many instances such is the actual result. Lord Eglinton informed John Hunter that when two soldiers were condemned to be shot, but one was to receive a pardon, the event being decided by their throwing dice, the one who proved successful—thus procuring a reprieve—generally *fainted,* while the one to be shot remained calm. Sir Phillip Francis referring to an important crisis in his life observes, "while my ruin was in suspense, I had felt infinitely greater distress of mind than now when it was determined. Extremities, once clear and unavoidable, reduce a man to take his resolution, and the very act of resolving gives vigour to the mind." In the foregoing case it would seem as if the mind, having been screwed up (so to speak) to the highest pitch of suspense, at once collapsed, when no subject calculated to occupy it or rivet the attention, either of present or future interest, presented itself. Whereas, when a certain fate was impending, the mind was aroused to contemplate it, and syncope averted. It may perhaps be said that the pungency of some painful emotions really prevents fainting, while a pleasurable emotion relaxes the system and favours it.

That intense pleasure may induce a fainting fit is illustrated by the case of Lucretia Davidson, the precocious American poetess who died æt. 17. "Her susceptibilities were so acute, and her perceptions of beauty so exquisite, as to cause her to faint when listening to some of her favourite melodies from Moore. Yet notwithstanding this serious impression, she would beg to have them repeated, so delicious were the sensations produced" (lxxviii, Jan. 1855, p. 219). The influence here, however, was no doubt of a mixed character, both emotional and sensational; the former element, nevertheless, was the proximate cause of the heart's temporary failure.

We often see that the above mentioned stimulus of Fear prevents fainting for just so long as it operates, and that directly it is withdrawn, the system yields to a reaction. Persons perform deeds of heroism in the immediate presence of danger, who do the right thing after the danger is over—swoon away. So familiar a fact may seem scarcely to deserve an illustration, but the following related by Hunter ('Posthumous Papers') is so much to the purpose that we cannot omit it. "A lady sitting up after every one was gone to bed, saw her door open, and a servant of the house come in with a pistol in his hand. She immediately blew out the candle, pushed the bed from the wall, and escaped between them. The servant in the dark pushed down the table she had been sitting by. This discomposed him; she came out of her hiding place, got out at the door, and had the presence of mind to lock it. She awoke the house, and as soon as she found assistance or was secure, *she fainted,* and none knew what was the matter till she came to herself. The man was secured, and it was found that he was out of his senses" (p. 265).

Tissot quotes from Water ('Miscellaneous Natural Curiosities,' pp. 162-298) the case of a military man, who being about to possess the object of his desire, was so overjoyed that he suddenly expired. A *post-mortem* examination was made, and the pericardium was found to be distended with blood, although no rupture of the heart could be discovered.

Joy caused actual death, according to Hume, at the restoration of Charles II. Dr. Rush says, there was a time when he doubted the truth of this assertion, "but," he adds, "I am now

disposed to believe it, from having heard of a similar effect from an agreeable political event, in the course of the American Revolution. The door-keeper of Congress, an aged man, died suddenly, immediately after hearing of the capture of Lord Cornwallis's army. His death was universally ascribed to a violent emotion of political joy. This species of joy appears to be one of the strongest emotions that can agitate the human mind" (lxi, p. 132). In this case and in the following, it is more than probable that death was the result of cardiac and not cerebral mischief:—

"A curious and sombre incident is reported from the gaming table of Köthen, in the Principality of Anhalt. A middle-aged man entered the room, and sat down to play. After a run of great luck, his winnings had augmented to the sum of a thousand ducats—equal to nearly five hundred pounds sterling —which the croupier pushed over to him. The fortunate gambler did not appear very anxious to have the gold and notes, and made no response when he was asked if he wished to continue playing. One of the servants of the establishment touched him upon his shoulder to draw attention to the unheeded winnings, and to the croupier's question, but the man remained strangely immovable; and when they came to look closer, they found that he was dead. He had 'passed' like the red! *Rien ne va plus* had proved true of himself, as well as of the last roll of the ball. Was it his good luck that had been too much for him? A thousand ducats is a pretty sum, the thought of which varies, doubtless, in proportion to the state of the pocket —but it seems hardly adequate to kill a man, under any circumstance. At all events the gambler was dead—some sudden 'click' in the mechanism of life had spoiled the works and made the subtle pendulum of being stop in its mid-swing. Even such a grim comment upon the worship of Mammon did not take away his presence of mind from the chief priest of the temple. The croupier no sooner perceived that Death had backed 'zero,' and won, than he raked the dead man's gold and billets back into the bank, declaring that a corpse could have no engagement or rights. The heirs of the defunct gamester are not satisfied with this axiom, and have commenced an action for the recovery of the sum."—(Daily Telegraph, March 7th, 1870).

Sweetser reports a case of Pelletan's as follows:—"The subject of this record was an Irishman, æt. 36, and of the most ungovernable passions. Having experienced during the revolutionary struggles various misfortunes and sufferings, he at length, on the affairs of France assuming a more favorable aspect, obtained a pension of 12,000 francs, but which was immediately taken from him on the death of the patron by whom it had been procured. This last misfortune, it would seem, completely overthrew him. 'He has told me a hundred times,' says Pelletan, 'that on hearing the news of his loss he immediately felt a dreadful weight in his chest. His respiration became fatiguing, and the palpitation of the heart assumed an irregularity which had no interruption during the two years and a half that he survived his misfortune.'

"On inspecting the body, the heart was found colourless and its whole substance in a remarkable state of flaccidity, such as the distinguished narrator never before witnessed. The parietes of the cavities, fell together, and the flesh of this organ might be compared to the pale and shrunken muscles of an old woman. There was an astonishing contrast between the flesh of the heart and that of the other muscles of the body. M. Pelletan did not hesitate to believe that the heart, in consequence of the violent mental shock, was struck with a sort of paralysis, and that death ultimately took place from the complete palsy of the organ."

In death from sudden emotion "an excitation is produced," says Brown-Séquard, "on the roots of the *par vagum*, which appear to have their true orgin in the neighbourhood of the seat of the *calamus scriptorius*, and in consequence the blood-vessels of the heart contract and expel the blood they contained, and with it the natural excitant which causes the movements of the heart. So that a complete syncope and death take place." He also speaks of death through the lungs from morbid action on the branches of the *par vagum* in these organs (lix, p. 226).

Dr. Carpenter explains the mode in which emotional shock destroys the heart's action as follows:—"Just as electricity developed by chemical change may operate (by its correlation with chemical affinity) in producing other chemical changes elsewhere, so may nerve-force, which has its origin in cell-formation, excite or modify the process of cell-formation in other

parts, and thus influence all the vital manifestations of the various tissues, whatever may be their own individual characters." After applying this law to the influence of mental states upon the properties of the various tissues and the composition of the secretions, he proceeds:—"Further, it not only appears that a simple withdrawal or disturbance of the nervous force supplied to particular organs, occasions a retardation or perversion of their vital operations, but there also seems evidence that an influence of an *opposite kind* may be transmitted through the nervous system, which is positively and directly antagonistic to the exercise of the vital powers of the several tissues. Such, at least, appears to be the only legitimate mode of accounting for the extraordinary effect of "a shock," physical or mental, in at once and completely destroying the contractility of the heart, and in bringing to a stand the vital operations of other parts. If the nervous force be regarded as a *polar* force, analogous in its mode of transmission to electricity, it is not difficult to understand that the reversal of the usual direction of its action may produce the effects in question; especially when it is borne in mind that the *direct* and *inverse* electric currents (as shown by Prof. Matteucci) exert opposite influences upon the nervous excitability" (viii, p. 346). In regard to the idea that the nervous force is polar in character, it certainly is in accordance with the character of the transmission of emotional influences; this transmission being the result of "a molecular change," taking place instantaneously along the nerves, in consequence of "a disturbance in the polar arrangement of its particles, at one extremity, which causes a similar disturbance to manifest itself at the other. Thus if

ab ab ab ab ab ab ab ab

represent the arrangement of the particles in the condition of equilibrium or quiescence, and this condition be disturbed at one extremity, by the operation of a new attraction upon the first particle *a*, a new arrangement will instantaneously take place throughout: this may be represented by

a ba ba ba ba ba ba ba b

which shows *b* in a free state at the opposite end, ready to

exert its influence upon everything submitted to it." (Op. cit., p. 354, and Todd and Bowman's 'Physiological Anatomy,' vol. 1, p. 240).

We have spoken of the influence of the lachrymal secretion as an outlet for emotional excitement. When this is arrested the bodily organs, as is well known, suffer, and the heart appears to be the first to receive the shock; cases of death are on record which appear to be referable to this cause.

In cases of exclusively cardiac paralysis the balance, as Dr. Richardson would put it, between the heart and lungs is broken on the circulating side, and we may have the illustration he adduces, that of cardiac apnœa, in which this disturbance of the normal equilibrium is exhibited. The respiratory apparatus intact and in full play, the patient breathes into lungs almost anæmic, and the tissue is more or less injured. "In one case of sudden death from this affection," he observes, "I found the bloodless lungs as white as milk, and so infiltrated with air as to distend the chest-walls, and to resist being emptied of air by the firmest pressure of the hand" (xlv, Feb. 2, 1867).

In some cases of death from emotional excitement, it is impossible to be certain that the heart has been the first organ to suffer; but it may be deemed highly probable in the following instances.

Several years ago a man named Filbey died at Twickenham after witnessing the death of a neighbour. I am indebted to Dr. M. Ward, who attended him, for the following particulars of this case, which, with its accompaniments (four deaths in all), was rather tragical.

Dr. Ward was called in on February 17th, 1870, to a Miss H—, residing next door to Filbey. He found she had been suffering for several days from fever, but had been out up to the day before. She had only returned, a few days, from attending the funeral of a sister who had died of typhus. The symptoms became rapidly worse, and she died the same night. Filbey himself, who was a butcher, came for Dr. Ward shortly before her death. During the night (3 o'clock) the doctor was called up to see a sister of Miss H—, who was suffering from hysteria. Dr. Ward saw Filbey at the house; he appeared to have been drinking somewhat, but talked rationally, and made the

remark, "I suppose it is only what we must expect from the shock she has received." Mrs. Filbey sat up with the patient, and Filbey himself went backwards and forwards between this house and his own, during the night. He appeared quite well, though depressed, and remarked, "I have never seen any one dead before, and hope I never shall again." Between 6 and 7, his wife came in and found him dozing in his arm-chair by the fire; he conversed with her and she asked him to have some tea, but he seemed more inclined to sleep, and she left him and went to bed herself; —his daughter, however, an intelligent child of eight, remaining with him in the room. About 7.30 a.m. she found her father was slipping down in the chair, and called the cow-man to lift him up, who came in and did so, and then left. An hour after, Dr. Ward was sent for and found Filbey quite dead, sitting in an arm-chair with his feet on another. His face was calm and he looked asleep; the extremities were cold, but not rigid. The daughter had been in the room the whole time and had not observed any change. Dr. Ward, assisted by two other medical men, made a careful post-mortem examination thirty hours after death, and could find nothing whatever to account for death. He says he never examined a more healthy body. Both ventricles of the heart contained a little fluid blood, the heart itself being normal in size and very firm in structure; its structure was not examined microscopically. The brain and cord were examined and found quite healthy, without appearing drained of blood; they were not at all congested. The stomach, which contained a little brandy and water, was healthy, as were all the other organs; "in fact," adds Dr. Ward, "we could not decide from what the man had died, but I gave it as my opinion that he had died from a sort of gradual syncope, produced by the fright, aided by the sitting posture. I certainly never met with a similar case, though I have often noticed the susceptibility of butchers to the sight of human blood, or on the occasion of any sudden illness." He appears to have been a tolerably steady man, but when he took too much was greatly excited and even dangerous. He had suffered from idiopathic tetanus years before, since which he had enjoyed good health. To wind up this tragedy, at the time of Filbey's death, his wife was expecting to be confined in about a month, and after apparently recovering well from the

shock, commenced flooding in about a fortnight, and died undelivered on the day three weeks after her husband's death ; a case of typhus fever being the first of this series of unhappy events.

The 'Medical Times and Gazette,' of July 28th, 1866, under the head of "Death from fear of an Operation," reports a case of death from apprehension ; the more remarkable because the sufferer appeared to be in nowise a nervous person :—

"A distinguished veterinary surgeon, about 60 years of age, of good constitution, and possessed of great moral force, had suffered for a considerable period from multiple stricture of the urethra and a highly irritable bladder. After the urine had become purulent and ammoniacal, the presence of four calculi was ascertained. In the hopes of being able to perform lithotrity, M. Cazenave persevered for a considerable time in an endeavour to relieve this painfully spasmodic condition of the urethra. These attempts were most courageously borne by the patient, but he was excessively disappointed when informed that lithotrity, which he was very desirous of undergoing, was out of the question, and that some form of lithotomy was the only operation that was eligible. Of this he was known to entertain a great dread, but, nevertheless, at once gave his consent to its performance, retaining to all appearance his habitual calmness. The patient having been placed and held in position by the assistants, M. Cazenave was on the point of introducing the catheter, when the patient, who had exhibited entire calmness and serenity during the preparations, was observed to become pale and faint, and in the course of ten minutes, in spite of all that was done, he died."

Dr. Currie, of Edinburgh, engaged to perform *paracentesis abdominis* in the case of a woman labouring under ascites. On entering the room the patient fainted. On attempting to restore her, he found she was dying. "She died of a sudden paroxysm of fear" (lxi, II, p. 114).

We are not aware that in any work on Forensic Medicine, the question is discussed whether death can arise from Chagrin. That it is one of practical importance may be seen from the following case, which appeared at the time it occurred in the

'Gazetta Med. di Torino,' Jan. 27, 1868, and the 'Medical Times and Gazette," Feb. 22.

A station-master of one of the Italian railways, 55 years of age, and in robust health, was awakened one morning with the news that his station had been robbed. He felt his responsibility so acutely that he immediately became ill, and died within twenty-four hours, all the assurances of his superiors and the encouragement of his relatives failing to reassure him. There was utter prostration, spasmodic action of the stomach, with obstinate vomiting, hollow voice and failing pulse; consciousness continuing to the last.

The railway administration, in a circular to its *employés*, narrated the facts, and offered its homage to the honorable susceptibility manifested by the deceased. It was also determined that his widow was entitled to a pension, her husband having met with his death as an immediate consequence of his service. The railway being in the hands of the Government, the court whose duty it was to carry out this decision demurred, and ordered that the widow should only be paid an idemnity of 1944 *lire* (£80). She appealed against this as an unjust judgment, and the case was referred to Signor Laura, Professor of Legal Medicine in the Turin University, to report upon. This he does at some length, but we can only present his chief conclusions:

1. That sudden mental emotion may induce death within a brief space of time, or even immediately, and even in persons in robust health, is a fact freely admitted in science.

2. The physical phenomena induced by such moral cause, indicate a deep perturbation of the nervous system, and are generally of a dynamic character.

3. The intimate connection of the mental emotion and the fatal result, in this case, is shown by the facts, that the evening before, the patient was perfectly well, and when awoke from a tranquil sleep by the dreadful news, he immediately became ill. No other possible cause could be assigned for the train of symptoms that followed, as the action of his heart prior to this illness was known to have been healthy.

4. The fact of death being delayed for twenty-four hours is no proof that it was not caused solely by the mental emotion. In

analogous cases, such as death from lightning or from poison, death, usually sudden, may be delayed in some individuals. Mental emotions may not always operate with the same force, and may meet with a varying amount of resistance, and there are also various conditions operating, which the present state of science does not enable us to appreciate correctly. It is very possible that had the news been brought to the patient during the time when his mind was occupied with his duties, in place of when just waking from sleep, his powers of resistance would have been greater.

Professor Laura's conclusion therefore was, that the man had undoubtedly died solely from mental emotion, induced by his great anxiety for the safety of the property, no preceding or accompanying cause of death being present. The court of appeal agreed in this opinion, which was also approved by the faculty of Bologna, *and the pension was decreed to the widow as if her husband had been killed while performing services for the company.*

Blood-vessels.—Passing from the heart to the muscles by which the supply of blood to the body is regulated, we find them to be strikingly influenced by emotional states.

Fletcher (lxxiv, p. 256) records a case of "Bellows sound of the arteries from irritable brain," in which, "on the application of an uncommonly severe mental irritant, the stream of blood passed loudly, like a rushing torrent through the vessels." The sound, however, "floated sometimes softly like a gentle stream, then in bounds or jets synchronous with the action of the pulse, over the cavities of the trunk, from the abdominal aorta to the arch in the chest and both subclavians." The patient was a lady of forty-six. The ailments of this person—originally a spoilt child—appear to have been misunderstood. She made an unhappy marriage. "Disappointment fell heavily. Every feeling was certainly not now indulged; perhaps few, or probably she expected too much. Something, too, might be said concerning a certain green-eyed monster and his fatal and malignant sway in married life." She eventually became insane. Mr. Fletcher refers the sound to a "strictured" condition of the vessels, but it is more likely to have arisen from the state of the blood, or from a relaxed condition of the vessels.

"Arterial relaxation with murmur," observes Dr. B. W. Richardson, "is the result of injury involving the emotional or organic nervous centres. I have seen it follow a direct physical injury, and I have seen it follow a mental shock as distinctly. It is a common result of intense grief, and is characterised by sudden changes of vascular tension, coldness, chills, frequent prespirations, irregular actions of the bowels, and, often diuresis. But the most distressing symptom of all is the arterial murmur. This is usually heard by the patient [this was so in Mr. Fletcher's case], and is sometimes mistaken for aneurismal tumour. It is produced at those parts of the arterial tract where an artery runs through a rigid canal, as through the abdominal opening of the diaphragm, or the carotid canal in the base of the skull. In rigid canals, the arteries being relaxed, the sides of the vessels press, with each impulse of the heart, on the surrounding resisting wall. Thus, there is vibration, and murmur is painfully audible to the patient. In these cases the symptoms are often developed in the most sudden manner, and recovery, again, is often as equally sudden" (xxi, Oct., 1869).

Mr. Fletcher gives another interesting case, of which the following is a condensed report:

A lady, when young, experienced an extraordinary degree of fright from a fall from her horse. It was a fortnight before the nervous system at all recovered from the shock. There is no doubt, however, that subsequent moral causes had a share in the full development of the case. The anomalous sounds were preceded and accompanied by a sensation in the lower part of the bowels, which resembled the crawling of worms. The sound consisted of a musical bellows-sound from the descending aorta, which the patient not unaptly called 'the chimes.' The sound was composed of an irregular succession of musical tones, just as the varying breeze gives melody to the Æolian harp; or it resembled the sighing of the wind through a chink in a door, or notes drawn at random across the string of a violin. It would then die away into silence, and be no more heard until some causes of mental agitation or sudden motion of the body would reproduce it. About the same period was occasionally heard a musical sound proceeding from the left carotid in the shape of

an octave, running regularly upwards. Standers by without a stethoscope could distinctly hear it " (op. cit. p. 323).

The attention directed, during the last few years, to the muscular tissues of the blood-vessels and to the vaso-motor nerves, has thrown great light upon the long-observed fact of the influence of Emotion upon the vessels. The pallor induced by Fear, the crimson blush of Shame (" O Shame ! where is thy blush ?") are psycho-physical phenomena universally recognised, and indicate the remarkable local vascular changes caused by various feelings of the mind, independently of the general disturbance of the circulation which emotional excitement may produce, by acting, as already described, upon the heart itself. The influence of Emotion on erectile tissues belongs to the same class; in fact, the increased action of the heart and rapidity of the general circulation may in this instance prove actually antagonistic to local hyperæmia. Cl. Bernard's demonstration of two distinct circulations—the cardiac and the capillary—the latter being directly controlled by the nervous system and acting " separately upon each individual spot of the body," is applicable here. It helps us to understand how some parts of the system may remain in their ordinary condition, while others are morbidly affected or exhibit certain physiological phenomena. Blushing is usually referred to as a typical example of the momentary paralysis or suspension of that vaso-motor nerve influence which induces the ordinary contraction of the capillaries; such suspension of the contracting power by an emotion being followed by congestion of the vessels of the face. Opposite emotions, according to the same theory, either stimulate the contractors of the minute vessels or simply permit their action by suspending the antagonising cerebral influence.

" Thus as he spake, his visage waxed pale,
And chaunge of hew great passion did bewray."

Wilkinson (xlix, p. 321), in his usual pictorial style, says of the skin of the face, " There it is that Love puts on its celestial rosy red, which is its proper hue; there lovely Shame blushes and mean Shame looks earthly. There Hatred contracts its wicked white; there Jealousy picks from its own drawer its boddice of constant green; there Anger clothes itself in black,

and Despair in the greyness of the dead; there Hypocrisy plunders the rest, and takes all their dresses by turns; Sorrow and Penitence, too, have sackcloth there; and Genius and Inspiration in immortal beams, encinctured there with the unsought ancient halo, stand forth as present Spirits in the supremacy of light. In a word, the compass of human nature, as it is seen and felt, is all to be referred to the inexhaustible representations of the skin."

Language derives several figurative expressions from this source, of which the German word for blushing—schamröthe—is a striking example. In our own language there is no corresponding term, but the man who never blushed in his life, and never will, finds, when charged with a shameful act, no stronger expression for the denial of it, than "I should *blush* to do it."

Increased vascularity under the influence of Emotion, chiefly when sudden, frequently causes extravasation or rupture of the small blood-vessels. Such cases must not, of course, be confounded with those in which violent contraction of the voluntary muscles occasions injury to the vessels imbedded in their tissue, and consequent effusion of blood. As vascularity, whether with or without extravasation of blood, forms one of the prominent signs of inflammation, it follows that the illustrations given, will more or less merge into examples of an inflammatory condition of the part, attended by swelling, tenderness, and heat. In all, however, the influence of mental states upon the blood-vessels is exhibited.

In illustration of the influence of Fear or apprehension upon the vascular system, I shall first give the following example,* the case of a highly intelligent lady well known to myself. Although the emotion had for its object another person, it none the less acted upon her own system:

One day she was walking past a public institution, and observed a child, in whom she was particularly interested, coming out through an iron gate. She saw that he let go the gate after opening it, and that it seemed likely to close upon him, and concluded that it would do so with such force as to crush his ankle; however, this did not happen. "It was impossible,"

* See also 'Manual of Psychological Medicine,' 2nd edit., p. 174.

she says, " by word or act to be quick enough to meet the supposed emergency ; and, in fact, I found I could not move, for such intense pain came on in the ankle, corresponding to the one which I thought the boy would have injured, that I could only put my hand on it to lessen its extreme painfulness. *I am sure I did not move so as to strain or sprain it.* The walk home—a distance of about a quarter of a mile—was very laborious, and in taking off my stocking I found *a circle round the ankle, as if it had been painted with red-currant juice, with a large spot of the same, on the outer part.* By morning the whole foot was inflamed, and I was a prisoner to my bed for many days."

A very interesting example of a local affection, caused by an excited imagination, is reported by Tissot, on the authority of Hoffmann. A man believed that he saw and was seized by a spectre, and was terribly frightened. One of his feet immediately became red and swollen, and afterwards suppurated. He became also convulsed and delirious. It is not stated distinctly whether he fancied the spectre seized him by the affected foot. If such was the case, the narrative would derive additional interest from the circumstance that the site of the bodily affection was determined by, and corresponded to, the locality imaged in the mind. The fact, in any case, remains, that fright produced inflammation and suppuration of one of the feet (xxxv, Sept., 1865, p. 164). The same authority records the case of a young man who was thrown into a passion, upon which his left ankle became swollen and painful. The knee also was similarly affected afterwards.

Fear during sleep is stated to have caused local inflammation corresponding with the image present in the mind in a dream. In the ' Bibliothèque choisie de Médecine,' by Planque, tome vi, p. 103, is the following case :—A man, thirty years of age, healthy and robust, saw in a dream a Pole with a stone in his hand, which he threw at his breast. The vivid shock awoke him, and then he found that there was on his chest (*dans le méme endroit*) a round mark, having the appearance of a bruise. Next day there was so much swelling, &c., that a surgeon was requested to see it, who, fearing a slough, scarified the part, and relieved it. The wound healed in a short time. Without more

definite information it would not be safe to build a theory upon this case, but looking at the previous one of the spectre, and others equally well authenticated, there appears no reason to doubt that the dream and the inflammatory action of the skin stood in the relation of cause and effect. Had there been any thing incredible in the dream acting as a cause, we might have thought it possible that the man had unawares received a blow, the previous day, in the region of the bruise and that it had suggested the dream. Its admission as evidence must then be determined by the authenticity of other examples, whether occurring when a person is awake or during sleep.

A powerful mental impression produced, in the following instance, physical effects corresponding in their locality to those anticipated in another person :

In the 'Medical and Surgical Journal,' May, 1835, a case is recorded "as having happened in France, in the practice of M. Diez, a French surgeon, of a lady, who is designated as Madame G—, aged 24 years, whose lips and mouth became suddenly enormously swollen, from having seen a child of a few years old pass the sharp blade of a knife between its lips without even cutting itself, which intumescence it required the usual applications to subdue, and which is represented to have had an appearance similar to that produced by the sting of a wasp, or some other poisonous insect, which there was no possibility of having occurred. This case is curious, as the organ affected was the same as the one for the apprehension for which, in the child, the nervous horror was experienced. How nature acted in this case it is, of course, impossible to suppose" (xli, p. 51).

In a case recorded by Lauzanus, mental excitement from a slight cause produced signs of local vascular disturbance; probably mere Attention, without an emotional state being aroused, would have hardly sufficed to do so. A young woman witnessed the lancing of an abscess in the axilla, and not only did she immediately experience pain in that region, but this was followed by inflammation and a decided swelling (lx, p. 154).

It may at first sight seem an extraordinary, almost incredible thing, that the action of the emotions should produce inflammation in any clearly circumscribed spot, that spot being determined by the direction of the thoughts at the moment;

but facts of the same kind, though less striking in their results, are familiar to all. Thus, no one would regard it as remarkable that on picturing oneself in a dangerous position—the foot, for instance, caught in a man-trap—the limb should start spasmodically, or experience a sensation of discomfort or actual pain. Yet so simple a phenomenon involves the same principle as the other more striking fact—the localisation of thought or emotion in the body, indicated by some external signs more or less marked according to the age, sex, constitution, or health.

Although repeating what has already been said in the chapter on the influence of the Intellect upon the involuntary muscles, we may observe that the fundamental principle upon which the class of phenomena now under consideration depends is this: that the mere circumstance of thinking of any part of the body, whatever may be the exciting cause, tends to augment the local afflux of blood, and innervation. Motion or sensation, or both, occur in the locality to which the thoughts are directed; but this effect is greatly intensified if accompanied by a powerful emotion.

Simple as this law is, it does, in fact, embrace and explain numerous facts which appear at first sight inexplicable, or to require more complete explanation.

Thus, if I see an injury done to the limb of another, my thought is turned to it, and by an inevitable association of ideas, based, in this case, on the far-reaching law of self-preservation, it is also directed to my own limb, and naturally to the corresponding one. Hence some effect is almost sure to follow—whether slight, or so decided as to leave its mark upon the tissues, or cause intense pain, must depend upon the force of the impulse conveyed from the brain, and the sensibility of the individual's system.

The evidence which can be adduced to establish a concurrent affection between the same limb or region of our own body as that of another person upon which our imagination is riveted, is confirmed by the movements, *not* hidden from the view, which we instinctively perform. Thus, if we observe a man receive an injury to any part of the body, we instantly apply our own hand to the corresponding part of our own body. It may be said this

is the consequence of a sensation of a painful kind experienced by ourselves in the part. Possibly, but, if so, the explanation is itself a proof of the position we seek to maintain. If, on the other hand, these *external* movements constitute an independent series of facts, it may be inferred from the relation existing between the vivid image in the mind of a certain person's limb, and his corresponding member, that a like relation may exist between the former factor and *internal* movements. In this connection it is also curious to observe how constantly it happens that, without the occurrence of any accident calculated to direct the attention strongly to a particular limb of another person, we assume the attitude of the person we are conversing with. A places his arms akimbo; B automatically does the same. A scratches himself; B follows his example. Hence the contagion of bad habits; hence the importance of good example. But the bearing of these everyday facts upon the subject under consideration is simply this: if there be so marked a change in the outer man corresponding with another person's condition, there is no reason to doubt an analogous change in the inner man. Call it imitation, or sympathy, or imagination, or what you will, the power which it exercises is so obvious in those parts of the body which can be seen, that we can have little difficulty in inferring changes from the same cause in those parts which cannot be seen. If A's hand is instinctively placed on the breast when he sees B plunge a dagger in his, there is every reason to believe that there may be hidden movements in the muscular coat of the vessels, not less definite, and resulting from a common law.

The occurrence of hæmorrhage in the brain and lungs in connection with emotional excitement, may here be briefly referred to.

Rupture of vessels of brain.—The stimulating influence of Emotion on the cerebral vessels, short of rupture, is witnessed in cases in which the surface of the brain is exposed by accident. One is recorded in the 'Medico-Chirurgical Review' (No. 46, p. 366). A robust young man lost a considerable portion of his skull. "When excited by pain, Fear, or Anger, his brain protruded greatly, so as sometimes to disturb the dressings, which were necessarily applied loosely; and it throbbed tumultuously,

in accordance with the arterial pulsations." In such a state, when

"Blood and revenge are hammering in my head,"

it is easy to understand an apoplectic sequence.

In March, 1870, a case of apoplexy from Fright or Anger occurred at Bradford, for the particulars of which I am indebted to Dr. Bell. A man who had previously threatened violence to some persons in the house where a woman lived, threw a stone against one of the windows. This woman, æt 56, nimbly came up from the cellar, went across the road to make inquiry, crossed to her own house again, complained of her hand feeling numb, went up stairs, threw herself upon the bed, and became insensible. This occurred about 7 p.m. Dr. Bell saw her at 9 p.m., when he found the right side, but not the face, paralysed. The patient occasionally opened her eyes and looked about. Died about 2 a.m., seven hours after the attack. *Autopsy*, 18 hours after death.—"Very fat. On opening the head, the superficial vessels were found very full of black blood; and on removing the brain, there were several ounces of bloody serum about the medulla oblongata. On slicing, there was seen a large pitchy black clot equal to size of fist in left middle lobe, opening into left lateral ventricle, between corpus striatum and optic thalamus, bursting through septum lucidum into right ventricle and filling it with bloody serum. The descending cornua of both lateral ventricles were filled with bloody serum, which had also burst through the base of the brain. Nothing apparently amiss with the medulla. The left ventricle of the heart was considerably hypertrophied and contracted; no disease of valves or aorta; did not notice any disease of the vessels of the brain, but suppose such must have been the case, and that an unusually powerful heart, suddenly acting upon weakened cerebral arteries, caused their rupture. She had been remarkably healthy. Nothing unusual was observed about her immediately before she ran up stairs."

John Hunter adduces as an instance of "mental emotion" inducing apoplexy, the case of "the person who invented or applied the steam-engine to the sailing of ships, and who, when it was before the Committee of the Society of Arts and Sciences, was taken at once with an apoplectic stroke, of which

he died in about twenty-four hours." ('Posthumous Papers,' vol. i, p. 264).

In the 'Lancet' of Nov 16, 1867, occurs a good example of the influence of Joy succeeding Anxiety in inducing death, recorded by the registrar of Preston, Lancashire. The subject was a female, aged 43, the wife of an overlooker. It appears that the daughter of the deceased was travelling by railway when a collision occurred, which caused injury to a large number of passengers. Alarming reports concerning the accident had reached the mother as she was waiting at the station for her daughter, who soon after arrived *unhurt*. The transport of joy, supervening on a state of mental anxiety, was more than her physical organization could bear. The mother after clasping her child in her arms, fell down in a fit, and expired twelve hours afterwards. In the medical certificate the case was returned as "apoplexy." It recalls the observation of Haller that "excessive and sudden joy often kills by increasing the motion of the blood, and exciting a true apoplexy."

Dr. Rush in his essay "On The Influence of the Revolution upon the Human Body" states that more instances of apoplexy occurred in the city of Philadelphia in the winter of 1774-5 than had been known in previous years. He says, "I should have hesitated in recording this fact, had I not found the observation supported by a fact of the same kind and produced by a nearly similar cause, in the Appendix to the practical works of Dr. Baglivi, Professor of Physic and Anatomy at Rome. After a very wet season in the winter of 1694-5, he informs us, that 'apoplexies displayed their rage; and perhaps some part of this epidemic illness was owing to the universal grief and domestic care occasioned by all Europe being engaged in a war. All commerce was disturbed, and all the avenues of peace blocked up, so that the strongest heart could scarcely bear the thoughts of it.' The winter of 1774-5 was a period of uncommon anxiety among the citizens of America. Every countenance wore the marks of painful solicitude for the event of a petition to the throne of Britain, which was to determine whether reconciliation, or a civil war, with all its terrible and distressing consequences, were to take place. The apoplectic fit which deprived the world of the talents and virtues of Peyton Randolph, while he filled the

chair of Congress, in 1775, appeared to be occasioned in part by the pressure of the uncertainty of those great events upon his mind. To the name of this illustrious patriot, several others might be added, who were affected by the apoplexy in the same memorable year" (lxi. I p. 131).

In many cases of death from emotional excitement it is impossible to determine, from the absence of particulars, whether lesion of the heart or brain has been the cause of the fatal result; as for example with Isocrates, to which Milton's lines refer:

> "As that dishonest victory
> At Chæronea, fatal to liberty
> Kill'd with report that old man eloquent."

Did he die of apoplexy or "a broken heart?"

Rupture of pulmonary vessels.—Descuret records the case of a woman, æt. 64, subject to violent fits of passion, in one of which "her little eyes sparkled, her face was injected, her large jugulars were distended, and a violent fit of coughing brought up in my presence bloody expectoration of a bright colour." She was relieved by bleeding, &c.

Dr. Sweetser cites from Broussais "the case of a lady, who on feeling a living frog fall into her bosom from the claws of a bird of prey while she was sitting on the grass, was instantly seized with such a profuse bleeding from the lungs that she survived but a few minutes" (xliii, p. 28).

The rupture of the cutaneous capillaries, or the transudation through their walls of blood so as to occasion "sanguineous perspiration," should be enumerated here among the results of emotional excitement.

I can, however, only refer to one well-marked case of the kind—that of "a sailor, aged 30, who was so alarmed by a storm that he not only fell on the deck speechless, but on going to him, Paulini observed large drops of perspiration of a bright red colour on his face. At first, he imagined that the blood came from the nose, or that the man had injured himself by falling; but on wiping off the red drops from the face, he was astonished to see fresh ones start up in their place. This coloured perspiration oozed out from different parts of the forehead, cheeks, and chin; but it was not confined to these parts, for on opening his dress he found it formed on the neck and chest. On wiping and

carefully examining the skin, he distinctly observed the red fluid exuding from the orifices of the sudoriparous ducts. So deeply stained was the fluid that on taking hold of the handkerchief with which it was wiped off, the fingers were made quite bloody. As the bloody perspiration ceased, the man's speech returned." (lxxi, p. 61).*

Before passing from the blood-vessels, we should notice the brilliancy of the eye caused by certain emotional states; partly due to tension of the muscles of the eyeball, and partly to the heightened vascularity.

The appearance of the eye in fierceness and fear is beautifully described in Rokeby :—

> "Hiding his face, lest foemen spy
> The sparkle of his swarthy eye."

Scott remarks on these lines, "After one of the recent battles, in which the Irish rebels were defeated, one of their most active leaders was found in a bog in which he was immersed up to the middle, while his head was concealed by an impending ledge of turf. Being detected and seized notwithstanding his precaution, he became solicitous to know how his retreat had been discovered. 'I caught,' answered the Sutherland Highlander, 'the sparkle of your eye.' Those who are accustomed to mark hares upon their form, usually discover them by the same circumstance" (Canto iii, Stanza iv).

Of Augustus it is said that, "like Apollo, his eyes were clear, and he affected to have it thought that they possessed some divine irradiation, and was well pleased if when he fixed his eyes upon anybody, they held down their eyes as if overcome by the glaring brightness of the sun."

The Iris.—The influence of Emotion upon the iris is shown in Terror by the widely dilated pupil. Gratiolet calls it the pathognomonic sign of this emotion. "Son disque noir semble quelquefois avoir envahi le cercle entier de l'iris; l'œil semble regarder alors dans des ténèbres profondes. Une pupille contractée ne convient pas à cette passion" (xv, p. 379). Here

* The interesting fact has recently been recorded by Mr. Frank Buckland, in 'Land and Water,' that a hippopotamus, being excessively savage after her confinement, perspired profusely, the perspiration being the colour of blood. Professor Gulliver found on examination that it contained numerous blood-corpuscles.

it would seem that the action of the sympathetic nerve supplying the radiating fibres of the iris, is allowed full sway by the temporary suspension or paralysis of the function of the antagonising cerebro-spinal nerve (corda tympani), induced by the shock of fright. It may be noted that the modern doctrine respecting the antagonism of sympathetic and cerebro-spinal nerves, has sprung from the supply of nerves to the radiating and circular fibres of the iris from these two systems, "the phenomena which take place in vessels being assimilated," as Bernard observes, "to those which occur in the iris" (1872); contraction of the radiating fibres of the iris answering to the contraction of the capillaries; that of the circular fibres to their active dilatation. Thus, Terror dilates the pupil because it allows the sympathetic free play upon certain muscular fibres of the iris, and induces pallor by allowing the sympathetic to contract the superficial capillaries.

The Skin.—Cutis anserina and horripilatio (observe its synonym *horror*) are the well-known effects of emotional excitement, especially Fear, on cutaneous muscle. The former so familiar to all, finds a poetical illustration in Joanna Baillie's lines:—

> "Yea, when the cold blood shoots through every vein;
> When every hair's-pit on my shrunken skin
> A knotted knoll becomes, and to mine ears
> Strange inward sounds awake, and to mine eyes
> Rush stranger tears, there is a joy in Fear."

The latter is no doubt assisted by the action of the occipito-frontalis in producing constriction of the scalp, but this could not cause the phenomenon of "the hair standing on end," without the contraction of the involuntary muscular fibre surrounding the roots of the hair.

> "Why do I yield to that suggestion
> Whose horrid image doth unfix my hair?"

Eliphaz and Æneas alike afford familiar illustrations of this phenomenon. Fear came upon the Temanite when he saw in his dream a mysterious, unearthly figure, and he says that as it passed before him, "the hair of my flesh stood up." The Trojan, frightened by the shade of Creüsa, tells the same story, "obstupui, steteruntque comæ."

Grief is said to have the effect of making curly hair straight;

this result being due to a cause of a different kind—deficient vigour of the nutritive processes. Indeed, it is difficult to speak of the changes which take place in the hair from Emotion without confounding several distinct causes. We may, however, refer to the marked effect on Expression induced by the motion of the moustache from the play of the muscles beneath in Anger, &c. This is assisted by the greater mobility of the upper, as compared with the lower lip.

Trachea and Bronchi.—Here should be enumerated cases of spasmodic croup and spasmodic asthma when excited by emotional causes; "nervous cough," occasioned by anxiety or nervousness, might be added. Public speakers frequently suffer from this annoyance *before* speaking, but are quite free from it when once they commence. This is not to be wondered at when even an experienced orator like Mr. Bright said only the other day, that he never came to a public meeting to deliver an address without "fear and trembling." We have already trenched upon this section when speaking of the spasm of the larynx (p. 200), and merely adding that dyspnœa is notoriously induced or aggravated by emotion, we pass on to affections of the alimentary canal.

Œsophagus, Stomach and Intestines:—As regards loss of motor power, it may be observed that emotional shock does not cause paralysis in the course of the alimentary canal so frequently as in that of the respiratory tract, but doubtless many instances do occur. Romberg, speaking of paralysis of the œsophagus, remarks that it has been occasionally observed associated with dumbness or aphonia as a result of violent mental emotion, and refers to the works of Joseph Frank (Prax. Med., vol. 1, p. 126), but I am unable to verify this reference.

Under this head some cases of hysterical tympanites might be given. One will be found in the 'Medical Times and Gazette,' for Dec. 10, 1859, in which the disorder was certainly of emotional origin, although not the immediate result of mental shock. Dr. Anstie, in observing that psychical influence in such cases probably acts through the splanchnic nerves, states that the course of their action beyond the thoracic sympathetic and towards the cerebro-spinal centre, is not certainly known. Petrowski believes there are two motor systems for the intes-

tines, the circular fibres supplied by the pneumogastric; the longitudinal supplied by the splanchnic (Biennial Retrospect, 1865-6, New Syd. Soc.).

Digestion is affected by the contractions of the muscular coat of the stomach as well as by the amount and character of the gastric juice, and therefore the disturbance of this process which so often results from emotional changes is due, in part, to abnormal contraction of these muscular fibres. Dr. Carpenter cites from Brachet the experiments upon the pneumogastric nerve in which "some hours after section of the nerve on both sides, the surface only of the alimentary mass was found to have undergone solution, the remainder of the mass remaining in the condition in which it was at first ingested," and he observes that "the moderate excitement of pleasurable emotions may be favourable to the operation, not only by giving firmness and regularity to the action of the heart, and thence promoting the circulation of the blood, and the increase of the gastric secretion, but also in imparting firmness and regularity to the muscular contractions of the stomach" (viii, p. 408).

Of the influence of Emotion in increasing the peristaltic action of the intestines, the ordinary effect of Fear and Fright affords the readiest illustration. The simple result of this muscular contraction—the discharge of the contents of the bowels—is rarely unmixed with increased secretion from the intestinal glands, and therefore we shall have to return to the consideration of these effects when we speak of secretion and excretion. It must be noted here, however, that the involuntary muscular fibres of the gland-ducts which discharge themselves into the alimentary canal are acted upon and contribute to the resulting diarrhœa.

Illustrations of metaphoric language derived from the connection between the emotions and the viscera have already been given in the chapter on Sensation, but we may add here one (rumination) having more particular reference to muscular action. Thus, Shakespeare, in 'Henry VI':—

"I may revolve, and *ruminate* my grief."

Under the division "Spasmodic cholera," Dr. Copland enumerates among the pathological changes, increased action of the *muscular* coats of the stomach, small intestines, the gall-bladder,

liver and common duct; the fatal issue being mainly due to the exhaustion of the vital manifestations of the sympathetic nerves, and the profuse discharge.

This appears to be the proper place to refer to those cases of icterus, which probably arise from spasm of the gall-duct. Dr. Watson says, "Certainly the *pathemata mentis* play their assigned parts; fits of Anger and of Fear and of alarm have been presently followed by jaundice. . . Mr. North witnessed a case in which an unmarried female, on its being accidentally disclosed that she had borne children, became in a very short time yellow. A young medical friend of mine had a severe attack of intense jaundice, which could be traced to nothing else than his great and needless anxiety about an approaching examination before the Censors' Board at the College of Physicians. There are scores of instances on record to the same effect." Dr. Watson seems inclined to connect the icteric and mental symptoms with spasmodic constriction of the gall-ducts, and does not adopt Mr. Mayo's suggestion that jaundice in such cases is due to the influence propagated through the nerves causing the formation of bile in unusual and rapid amount in the blood (lxxii, II, p. 557).

Shakespeare recognises the truth of the occurrence of icterus in consequence of mental states, in the "Merchant of Venice:"

> "Why should a man whose blood is warm within,
> Sit like his grandsire cut in alabaster?
> Sleep when he wakes? *and creep into the jaundice*
> *By being peevish?*"

But probably peevishness would be more likely to cause jaundice by acting directly on the secretion of the liver than by causing spasm of the gall-duct.

In the 'British Medical Journal' for Nov. 19, 1870, is the report of a case of "Jaundice after Anxiety," by Mr. T. Churton, of Erith:—

"A married lady, æt. 30, had an attack of jaundice, October, 1868, after mental and physical fatigue. The ordinary remedies were used, the nitro-muriatic acid being the most useful, but the discoloration persisted for some weeks. Six months afterwards she had another attack, which appeared to arise from similar causes. She had several visitors staying in the house,

and having little inclination for society, was somewhat disturbed by attending to them, and by the addition to the ordinary cares of the household. In the midst of this anxiety, one of her children, subject to asthma, had a severe attack one evening, and was in considerable distress all night. Next morning at five o'clock, I found her sitting up in bed, rocking to and fro, and complaining of acute pain in the hepatic and gastric regions. Pulse 72; temperature 98·4 deg. She showed slight but unmistakable symptoms of hysteria—quivering eyelids, &c. Ten grains of bromide of potassium were given, therefore, every four hours. The first dose cured her of all pain at once. On the following day, however, I found her completely jaundiced, and the urine of a dark brandy colour. The bromide was continued, but less frequently, and an aperient given. Next day the jaundice was less intense. Two days after, the yellowness had entirely gone, and the urine was of a natural colour."

Mr. Churton adds,—"I do not pretend that the aperient pill had nothing to do with this rapid recovery, but, on the other hand, we know how little purgatives avail in such cases. Neither do I think they would have availed anything in this case, had not that condition of the nerve-centres upon which (no matter how) the jaundice ultimately depended, been first, as it were, neutralised by the bromide. Nevertheless, I should have laid little stress on a single case but that Mr. Jessop, of Leeds, to whom I am indebted for the suggestion of this plan of treating nervous jaundice, tells me that he has several times used the bromide with equal success."

Ureters, Bladder, and Urethra.—We shall only notice here the familiar effects of Fear, &c., in causing spasm of the expulsor muscle of the bladder and inducing urgent micturition. The following is given by Romberg as an example of spasm of the bladder from the fear of approaching death:—"A Judge of the Criminal Courts related to me that a man, convicted of highway robbery and murder, who was executed some years ago in the town, before mounting the scaffold, prayed to be allowed to gratify the urgent desire to micturate." He adds, "Even certain mental impressions are capable of inducing a greater inclination to frequent contractions of the vesical muscles, as in other instances they affect the muscular fibres of the rectum.

We occasionally meet with hypochondriacal patients who think of nothing else but the state of their evacuations. I have had a gentleman of this description under my care, who always remained in the vicinity of his house when he took a walk, in order to be able at once to follow the call of nature. There was another who had heard that the formation of calculus could be prevented by frequent micturition; after the impression had ceased to harass him, he was still often reminded of it by an annoying sense of strangury" (xxxiv, II, p. 31).

Uterus and its appendages.—Under this head we shall only refer to the fact familiar to every general practitioner—the influence of violent emotion in causing miscarriage, and of arresting uterine contraction in labour. Hence, if an accoucheur leave his patient and another take his place, the progress of labour is generally impeded; uterine contraction ceasing for hours. Yet medical men often strangely forget the importance of avoiding unpleasant mental impressions under such circumstances. I have known an accoucheur, devoted to natural history, improve the occasion by coolly bringing out of his pocket an adder which he had just secured in one of his country walks. I believe the patient did not find the exhibition so useful as to make her particularly desire to have the same medical attendant again.

In a case recorded by Professor Laycock (iv, p. 112), Attention and emotional excitement combined, brought on uterine pains in a female, æt. 48, who was attending her daughter during a very tedious labour.

Dr. Gooch records the case of a lady whom he attended, who with great difficulty was persuaded to marry, in consequence of an imagination that she would certainly die should she become pregnant. Such was the influence of this apprehension upon the course of the labour, that, in spite of all the encouragement Dr. Gooch gave her, it interfered with its progress in so marked a manner as to protract it to a period of thirty-six hours.

The death of the Princess Charlotte, acting on the imagination of women similarly circumstanced, injuriously retarded labour in many instances. Dr. Gooch's practical conclusion is, "In this state of mind we must keep up the spirits of our patient,

both during pregnancy and at the time of labour, by anecdotes of the most favorable accouchements of those who have entertained equal apprehensions, and by every species of encouragement in our power' '('A Practical Compendium of Midwifery,' p. 181).

CHAPTER. X

INFLUENCE OF THE EMOTIONS UPON THE ORGANIC OR VEGETATIVE FUNCTIONS.

The emotions powerfully excite, modify, or suspend the Organic Functions, causing changes in nutrition, secretion, and excretion, and thereby affecting the development and maintenance of the body.

We have in the consideration of the influence of the emotions upon the heart and blood-vessels anticipated, to some extent, the principles which underlie the phenomena of organic life referred to in this chapter. The important part played by the vaso-motor nerves has been dwelt upon, chiefly in connection with the vascularity of the skin, which so manifestly results from emotional excitement. The circulation of the blood through the various organs of the body being affected by the same cause, the action of the emotions in inducing well-marked changes in nutrition and secretion is not extraordinary. The question which arises, whether these variations in the circulation of the blood in the organs and tissues adequately account for the alterations in nutrition and secretion which follow, has already been considered (p. 91), and the conclusion been arrived at, that varying mental states may act upon these processes directly through the nerves as well as through the capillary circulation.

Blood.—Pleasurable emotions by their influence on the heart and respiration favour oxygenation of the blood; and we are all conscious of the

> "Sensations sweet
> Felt in the blood, and felt along the heart,"

depressing emotions producing the contrary effect.

The direct influence of emotional excitement upon the blood itself appears to be exhibited in the case recorded by Hunter—that of a man who died in a fit of passion, and in whom it was found fluid—as in death from lightning or a blow on the stomach. Dupuy's experiments on animals (after being hunted) are adduced to show that mere rapidity of the circulation diminishes the fibrin in the blood. So in overdriven animals, the quality of the blood is injuriously changed. But in these instances it is quite possible that Fear may have had its share of influence. On how many occasions does active bodily exercise in man inordinately quicken the circulation, without any bad effect as regards the blood! Dr. Wilks (xlv, Feb. 1, 1868) observes, "We hear sometimes of fear turning the whole mass of the blood. I believe this is literally correct. I have seen now so many cases of anæmia, some of them fatal, occurring upon a severe shock of the nervous system, that I have no doubt of the fact." He then refers to the *modus operandi,* but frankly confesses his ignorance until physiologists will inform us in what part of the body the blood is manufactured. Those who explain everything by the varying calibre of the blood-vessels, would fully admit that mental states influence, not only the amount of the blood in a vessel during a given period of time, but also thereby its chemical composition. Cl. Bernard tries to prove, experimentally, how the nervous system controls (and therefore how Emotion may influence) the absorption of oxygen by the blood in the lungs, and its combination with the histological elements of the tissues. As his experiments on the relation of secretion to the blood prove that, during this process, the blood in the veins of the glands, which is usually dark in colour, becomes of a bright arterial scarlet, and as he accounts for these phenomena by the opposite action of the two classes of nerves —the contracting and dilating—which supply the vessels;—results which may be artificially induced by *section* and *galvanism* —it follows that even if we go no further than Bernard's mechanical views, varying emotional states would readily affect the relative amount of oxygen and carbonic acid gas in the blood. As the transformation of the effete materials of the tissues, taking place in the capillaries, requires time, and therefore a certain stagnation of blood for the operation, if the emotions

interfere with this condition, it is easy to see that there will be a tendency for arterial blood to pass unchanged into the veins, as actually occurs when the sympathetic nerve is divided. Changes of psychical origin in the quantity and quality of the blood, and consequently in secretion and nutrition, may thus receive at least a partial explanation by our application of Bernard's experiments. Increase of temperature, and thereby of certain chemical phenomena, must also be included. That changes in the chemistry of the blood may, however, be produced in a more direct manner is, to say the least, very probable. The knowledge of Bernard's experiments did not prevent Brodie remarking that the influence of nervous power "in causing the blood to umdergo changes in its chemical composition," as well as in "affecting the secretions," is very analogous to the effects produced by the voltaic battery.

The question of the changes produced in the blood by certain conditions of the mind, obviously bears upon the alleged *influence of the mother upon the embryo*. While the evidence in regard to it is far from being so complete as we could wish, it is certainly sufficient to raise a strong presumption in favour of the action of mind upon blood in this instance. If the effects are granted, the inference that the blood is the channel through which they are produced appears the only legitimate one, so long as no anatomical proof is forthcoming that there exists any connection between the nervous system of the mother and the fœtus in utero. Since Bichat wrote, nothing has been discovered to disprove his position that "it is by the modifications which the mother's blood receives from vivid emotions that we must explain their influence upon nutrition, the growth, and even the life of the fœtus, to which the blood is supplied through the placenta" (li, p. 43).

What the extent and character of this influence are is, however, a question on which much difference of opinion exists, and many appear unable to see any alternative between admitting all the absurd stories about "mother's marks," and denying maternal influence altogether.

A few cases recorded by medical observers may here be briefly alluded to, for the purpose of illustrating the point at issue.

I give the first four on the authority of Dr. Bayard, who published them in the 'Annales Médico-Psychologiques' (1851, p. 478). They are fair examples of a class of facts frequently reported in the medical journals.

1. A woman, aged 24, of good constitution, and the mother of two healthy children, went to a fair and entered a show-place where was exhibited a collection of living and stuffed animals, and monsters preserved in spirits, among which was *a hydrocephalic cat*. From the moment she saw this she wished to leave the place, crying out, "How horrible! it is just like a child!" Her companions laughed at her fright and insisted upon her remaining. Eight months afterwards she had a child, stillborn and *hydrocephalic*.

2. Madame C—, during the second month of her pregnancy, saw a cart pass containing three men condemned to death. One of them, faint, had *his head inclined to the right;* his appearance indicating the most complete mental prostration. This lady gave birth to a child, having *the head turned to the right* shoulder—a morbid contraction which was permanent.

3. Madame B—, the mother of four well-formed children, experienced, early in her fifth pregnancy, various nervous sensations to which she was a stranger; such as spasms, and tonic contractions of the muscles. Towards the third month, Madame B— had a strong desire to eat mussels—a longing not gratified until the end of a week. When, however, she saw them, disgust took the place of desire, and ever afterwards she felt a great repugnance to them. Her accouchement was easy; the child, however, had a mark upon its left leg, of violet colour, and of the size and appearance of the mussel-shell.

4. A woman, when *enceinte*, witnessed a fire in the direction of her father's home, and was much alarmed; as the event proved, not without reason. As the place was many miles distant, a long time passed without any definite tidings. This uncertainty acted powerfully upon her imagination, and she constantly saw a flame before her eyes. Three months afterwards she gave birth to a child, which had on the forehead a mark, red, pointed, and undulated like a flame. This mark

was not effaced until she was seven years of age. Baer, in reporting this circumstance, says that he does so because he has the best means of knowing all the details, seeing that the lady was his own sister, and that he had heard her complain before her accouchement of having a flame continually before her eyes.

5. In the 'Lancet' of November 7th, 1868, Mr. Child records a case illustrating, he considers, the influence of "maternal impression." The child was born on August 26th, 1868, and was naturally formed, as regards the body, except the nails on the thumbs, which were like those of a rabbit. "The parietal, frontal, and part of the occipital bones were wanting; and at the space corresponding to, but larger than the anterior fontanelle, was the brain, entirely denuded of skin or membrane, not even being covered with arachnoid. There was a little hair over the eyes, none elsewhere. The eyes, palate, and tongue were similar to those of a rabbit." Mr. Child then found that during the second month of pregnancy the mother went to a penny show, in which she saw a trained horse pull the trigger of a pistol, pretending to shoot a rabbit. A dummy was then thrown out; the back of its head was bleeding, having to all appearance been shot off. This corresponded, as the mother-in-law declares, to the mark on the child's head. My patient seems never to have forgotten the circumstance during the remainder of her pregnancy, and was considerably frightened at the time.

6. This case, which we owe to Malbranche, and which will be found in Goldsmith's 'History of the Earth and Animated Nature,' is one not unfrequently referred to. It is that of a woman in Paris who witnessed a criminal broken upon the wheel when she was two months advanced in pregnancy. We are told that she was of "a tender habit of body, and though led by curiosity to this horrid spectacle, very easily moved to pity and compassion. She felt, therefore, all those strong emotions which so terrible a sight must naturally inspire; shuddered at every blow the criminal received, and almost swooned at his cries." On her return, and for some days, she was in a downcast state, and "her imagination still wrought upon by the spectacle she had lately seen. After some

time, however, she seemed perfectly recovered from her fright, and had almost forgotten her former uneasiness. When the time of her delivery approached, she seemed no ways mindful of her former terrors, nor were her pains in labour more than usual in such circumstances. But what was the amazement of her friends and assistants when the child came into the world! It was found that every limb in its body was broken like those of the malefactor, and just in the same place. This poor infant, that had suffered the pains of life even before its coming into the world, did not die, but lived in a hospital, in Paris, for twenty years after, a wretched instance of the supposed powers of the mother, in altering and distorting the infant in the womb" (vol. ii, p. 244).

7. In the 'Lancet' of August 17th, 1867, Mr. T. Smith, Assistant-Surgeon to St. Bartholomew's Hospital, in a paper on "Mother's Marks," observes that "one cannot doubt that these marks occasionally appear on children in connection with mental impressions received by the mother during pregnancy." He then adds: "I will show you a striking case that came under Mr. Paget's observation. This child was admitted into St. Bartholomew's Hospital in 1865. She was at that time twelve years old. The left upper extremity and the greater part of the corresponding side of the trunk and neck were deeply stained with dark brown pigment, from which grew an abundant crop of brown, harsh, lank hair, varying in length from one to two inches. The skin was rough and harsh; the arm was long, thin and withered; the scapula was unnaturally prominent. In fact, the upper limb, shoulder and back, bore a very strong resemblance to the corresponding part of a monkey. The mother stated that when three months pregnant with the child, she was much terrified by a monkey attached to a street-organ, which jumped on her back as she was passing by." Mr. Smith concludes his report by the remark, "I need scarcely say that such a case does not stand alone. There are many well-authenticated cases where marks and even bodily deformities in the fœtus, can be fairly attributed to strong and persistent mental impresssions in the mother."

Such cases as these appear to countenance the conclusion that the Imagination of the mother, united more or less with

Emotion, produces corresponding effects upon the unborn child. The number reported by various medical men is large, and undoubtedly deserves consideration. The shallow objection that such effects of the maternal imagination are impossible, is easily, and (for this reason) frequently made. On the other hand, it must be admitted that these reports ought to be received with great hesitation, not from there being any reason to doubt the good faith of the reporters, but on account of the peculiar liability which obviously exists to colour the facts, and make them square with a preconceived theory.

Coincidence may fairly be allowed to explain some of these occurrences: what more likely, for instance, than that out of the considerable number of children born hydrocephalic, the mother of one should attend a fair, see an exhibition of monstrosities, and be affected disagreeably during the time of her pregnancy?

Further, it must be borne in mind that there are a very large number of instances in which accoucheurs have carefully noted the expectations of the mother before delivery, without the slightest fulfilment of such expectations in any corresponding bodily affection of the child.

Thus Dr. Fisher, in the 'American Journal of Insanity' (Jan., 1870), says that during twenty years he has made a practice of asking his patients whether they expected any deformity in the child, and by far the larger number expressed their fear of such a result, and frequently specified the nature of the deformity; and yet only two cases of malformations occurred during this period, and these did not appear to be in any way connected with the longings, &c., of pregnancy. He speaks of 1200 cases, and maintains that Dr. Hammond has failed to prove his position that maternal states cause malformations. Hunter also made inquiry in 2000 cases before the birth of the child, and failed to find in a single instance any connection between a mental emotion in the mother and an abnormal development of the child.

However, although we may not be prepared to accept the evidence in favour of the production of special marks in the child answering to definite mental images in the mother, we must admit that the mental condition of the latter may, through

the blood, affect the nutrition and therefore the vitality of the former.*

Nutrition.—The fact pointed out by Bichat, that nutrition does not seem to receive so direct an influence from the emotions as secretion, circulation, digestion, and respiration, is attributed by him to the absence of a distinct focus or viscus, whose state we can compare with that of the mind. Disseminated throughout the organs, their phenomena do not strike us in the same way as when concentrated in a narrower space, but they are not less real, as witnessed in the bodily contrast between the man who passes his life in misery, and him who passes it in mental tranquillity. Bichat (writing in 1800) recalls and contrasts the time when Fear, Sadness, and the desire of revenge seemed to hover over France, with that in which security and abundance excited the gaiety so natural to his countrymen, and points to the difference in the exterior aspect of their bodies in proof of the influence of the emotions on nutrition. I know several interesting examples of the same influence as the results of the late war in France.

A lady informs me that at Tours many lost their health, and some died from fright. A young lady was standing with her father at the window when the Prussian soldiers came down the *tranchée,* and was seized with shivering ; her father who could feel her trembling, said—"You need not be frightened, they will not hurt you ;" but she had received a shock from which she became quite blanched, and lost her sleep and flesh. She has not yet fully recovered her strength, and remarks that she has never been able to keep her feet warm since that day.

Dr. Boggs, in a letter to the 'Lancet,' dated June 21, 1871, writes :—"The only hope of the Parisians which they fondly cherished, and which, in a great measure, kept them alive during the siege, was most cruelly blighted, and you may imagine their disappointment when the capitulation of the city was announced ; the mental shock to some was such that they almost lost their reason. . . . . But the most remarkable effect of the siege was the aged appearance of some of the inhabitants ; men and women alike seem to have passed over at

* In favour of the influence of the mother on the embryo, see a paper by Dr. Meadows in the 'Obstetrical Transactions,' 1865.

least ten years of their existence in half as many months. A friend of mine, a distinguished practitioner in this city, nearly fifty years of age, has become so gray and wrinkled, and such other changes have taken place in his constitution, as to give him the appearance of a man of sixty."

The influence of a violent and painful emotion on nutrition is well shown in the following well-told case :—

" Returning from a professional visit late one evening, I was met by a medical friend who begged me to see with him a gentleman whom we both had previously well known, stating that he was in a deplorable state and wished to see me. I at once consented, and we walked on together. 'You have, of course,' said he, 'heard of his unfortunate accident.' I said I had heard some vague reports of his having shot some gentleman accidentally. 'Alas,' said he, 'that was not all. You must remember him, one of the handsomest young men in the university.' I said, 'Yes.' 'Wait until you see him now ; he is truly a victim to mental distress ; his form is reduced to a skeleton, and his strength scarce that of an infant's. The circumstances are these :—He was spending the shooting season at his uncle's in ——shire, when his cousin, to whom he was much attached, about his own age, and an only child, irritated him by some frivolous remarks while on a shooting excursion ; words ran high on both sides, and they being only attended by a little boy of ten years old, who could not interfere, a struggle ensued, in which the poor victim we are going to see, shot his cousin on the spot. He then returned, scarce conscious that he did so, to his uncle's house, detailed the events, from the effect of which within a month he saw his uncle and aunt carried to their graves, while he exists a miserable wreck, soon to follow them.'

" Such as he was described I found him : his hand was hot and feverish ; his cheek pale and withered, and his frame a perfect skeleton ; his voice was deep and hollow, and his expression agonized and wretched, yet he complained of nothing. It was clear that his nervous circulation was suspended ; yet his thinking principle was awake, and consciousness alive. The mental or nervous stimulant was withdrawn, having by the shock of the accident been directed into another channel, which was necessary

to keep in activity the animal functions, and a general stagnation ensued, until exhausted nature sunk from inanition" (xli, p. 50).

Of the disastrous influence of disappointment in love in causing mal-nutrition in the form of pulmonary disease, I may refer to the case of a young lady, the daughter of my old French master M. de M—. I avail myself of the graphic pen of a well-known writer, "Holme Lee," to describe this case, and shall not apologise for introducing so florid a sketch into a medical work :—

"There is his grave, and his darling Vic's close by it, in the quiet churchyard behind the arches of the Abbey, tufted greenly over; but to-day all white and daisied with the spring. What a bright face it was, that face of Vic's, which just faded and faded and died away from the sun, in the very prime of the morning! Here is a picture of a brilliant August day out of doors; but in the Professor's study all is grave and quiet, and the long table is cleared for the incoming class. There is sturdy little Fan, just on a comfortable level with her books; and pretty Vic, who has attained to the dignity of helping her father, seated with her back against the light, and the roses of her cheeks all in full glow under the shadow of the dark grape-clusters of her richly tinted hair. She rests her elbows on the big dictionary, and props her dimpled chin in the palms of her wee white hands, on one finger of which gleams an emerald ring—symbol that her heart is given away, and her maiden promise plighted already. The door opens, and two scholars enter with mysterious air and abrupt news. 'There's a wedding at St. Olave's this morning; have you heard of it, Vic?' cries one. 'We always thought you and Willy were engaged; did you really break off when you quarrelled? It *is* that widow! she has nothing but her money. I would not care if I was you, Vic; he was never worth caring about!' And then the chatterer subsides into a frightened silence, *for out of Vic's face die away the roses and the sunshine, as if the hand of Death had passed over it and turned it to clay. Not a word breathes from her white lips; they only stir with a dumb fluttering pathos, while a blank gaze steals over her beaming hazel eyes and quenches their lustre for ever.* No one ever saw Vic smile again. She does not help her father that morn-

ing, and he is a little testy over our lessons; he will have the window shut, sultry as it is; for we can hear the wedding-bells ringing at St. Olave's while we are gathered at our work. Her mother has told him hurriedly Vic is not well, and he must do without her, and he is fidgety and fretful that anything should ail his darling and he not know why. He will know why soon enough—soon enough!

"And this is a day in the fall of the leaf. The chill October winds have begun to blow, and Vic is sitting by our parlour fire, at home, talking to my eldest sister very seriously and sadly, myself listening with an awed, silent sympathy to the old, old story she is telling; I fancy I can hear her still! 'Yes, they had quarrelled, but they had made it up again, and she thought it was over; he kissed her the last time they said good-bye; they were quite friends. Oh, yes, quite friends! She had no more idea of his leaving her, and marrying anybody else, than she had of the Minster falling! Her grief would kill her, *is* killing her—her heart is broken' she says; speaking not in her old sweet voice, but in such a querulous sharp accent as might thrill from the chords of some fine instrument when overworn, and jarred all out of tune. She had her pretty caprices in her happy days, and perhaps by practical people she may be considered a little fantastic and sentimental now; but by-and-by every adverse tongue is hushed, for it begins to be whispered amongst us *that she is going off in a decline.* And before the snow-drops come again she is gone" ('In the Silver Age,' 1866, p. 140).

Hunter considered that nothing shows the influence of the Mind upon the Body more strongly than the effect of maternal anxiety in a hen when hatching. "A hen shall hatch her chickens, at which time she is very lean; if those chickens are taken from her she will soon get fat, but if they are allowed to stay with her, she will continue lean the whole time she is rearing them, although she is as well fed and eats as much as she would have done if she had had no chickens" ('Posthumous Papers,' vol. i, p. 261).

Care, it is said, will kill a cat; and its effect, as regards man, is too patent to need illustration. As pointed out by Fletcher, the convict may grow fat even on prison fare, simply because

his doom is sealed and he has no anxiety. When considering the influence of the emotions upon the blood-vessels, we showed that all the signs of those changes in nutrition which are comprised under the term "inflammation" may be so caused. We proceed now to give illustrations of definite lesions of nutrition, as observed in the changes which frequently take place in the *skin* and *hair*.

As, without actual disease, we see the influence of moral causes upon the functions of the skin, Fear checking perspiration, and other emotions causing congestion, it is not surprising that definite eruptions should occasionally have a similar origin. The transition to eczema, impetigo, &c., is not difficult to understand.

Mr. Hutchinson informs me, in connection with his experience at the London Skin Hospital, that patients frequently attribute the affections of the skin under which they labour to fright and other moral causes; but I have not been able to obtain any statistics. The relation between some cutaneous diseases and the distribution of nerves bears upon this subject. The instance of shingles has been already referred to in connection with the nerves engaged in nutrition. When severe neuralgia is followed by herpes in the course of the affected nerve, we can see how possible it is for distress of mind to occasion this cutaneous disorder.

Cazenave, when enumerating the causes of skin-diseases, remarks that "strong mental emotions, and Grief in particular, exercise a remarkable influence." Speaking of impetigo, he says that Grief and Fear sometimes produce the disease. Bateman mentions two cases in which great alarm and agitation of mind caused this affection.

In his lectures, M. Biett used to relate to his pupils several cases which showed this influence. In particular he referred to a striking example exhibited in a very severe form of *lichen agrius*, occurring within twelve hours of the receipt of unwelcome intelligence. In the 'Medical Times and Gazette,' July 13, 1867, the case is reported of an engineer who, treated for syphilis, from which he remained free for six years, became, a week after hearing of the fall of a bridge he had built, the subject of "syphilitic impetigo of the scalp and beard."

Gratiolet observes that Melancholy dries up the skin and induces a number of herpetic affections.

Guislain mentions two cases bearing on this subject; one in which a woman, who had seen her daughter violently beaten, and was much frightened, suffered in consequence from gangrenous erysipelas of the right breast; the other in which a woman, æt. 24, saw her brother die, and was greatly affected. A wen which she had on the head became gangrenous in a few days. "L'odeur qui s'en dégageait le décélait suffiisamment" ('Leçons Orales,' p. 166).

In connection with the influence of the emotions upon nutrition, its generally recognised effect in inducing cancer should be mentioned, a predisposition in the system being probably necessary. Descuret reports the case of a young woman who had cancer of the breast requiring operation, which he attributes to the maleficent action of Jealousy, Hatred, and Chagrin (lxvi, p. 621). Romberg says he attended a lady, æt. 40, whose right mamma had four years previously, after violent mental excitement, become attacked with scirrhus, which was being gradually developed (xxxiv, I, p. 150). Bichat maintains that cancer of the stomach frequently owes its origin to powerful emotions —"l'impression vive ressentie au pylore dans les fortes émotions, l'empreinte ineffaçable qu'il en conserve quelquefois" (li, p. 40).

Hair.—The influence of Grief or Fright in blanching the hair has been generally recognised.

> "For deadly fear can Time outgo,
> And blanch at once the hair."

It has been a popular rather than a physiological belief that this can occur "in a single night." No one doubts that the hair may turn gray, gradually, from moral causes, and this is sufficient proof of the mind's influence upon the nutrition of the hair. I have known alternations in the colour of the hair (brown and gray) corresponding to alternations of sanity and insanity. Some entertain doubts as to sudden blanching of the hair, but I do not believe them to be well founded, and will give in illustration the following interesting case which occurred in the practice of my friend Mr. W. P. Cocks, of Falmouth:—

Thomas W—, about 20 years of age, the son of a milkman, was tall, fleshy, good-looking, slightly bronzed, hair intensely black, stiff, wiry, and rather inclined to curl. His general appearance was that of a healthy and well-formed man, used to light work, but much exposure in the open air. One of his thoughtless companions told him (what was not true) that a young woman in the town was going to swear before the magistrate, on the morrow, that he was the father of her child. Poor W— was dumb-founded. The announcement had given his whole frame a severe shock; the gall of bitterness had entered his heart, and the mind was under the baneful influence of its power. He hastened home, and sought relief in his bedroom. Sleep was denied him, for his brain was on fire. He saw nothing but disgrace coming from every angle of the room. Such was the mental agitation produced by a silly trick! Early morning brought no relief; he looked careworn, distressed, and his hair was changed from its natural tint to that of a light "iron gray colour." This to him was a great mystery. In the course of the following day the stupid trick was explained, but the ill effects of it lasted for a long period. Nearly twenty years after, although his health was fair, the mental powers retained signs of the severe shock they had received; his hair was perfectly gray, and it was but too clear that he would carry the marks of this folly to his grave.

I know of a captain of a vessel, under forty years of age, who suffered shipwreck twice. On the first occasion (in which he lost all hope) his hair quickly turned gray; and on the second, some considerable time afterwards, his hair became still further blanched. He resolved never to go to sea again, and kept his resolution.

A lady travelling in France subsequently to the Franco-Prussian war heard of a considerable number of cases of hair blanching (more or less marked), in consequence of fright.

Dr. Laycock, in speaking of pigmentation of the hair, asks whether grayness and baldness are due to loss of tone of the hair-bulbs solely, or are ultimately associated with trophic nervous debility of certain unknown nerve centres. He points out that the regional sympathy which characterises trophesies is well marked, and that as regards baldness it extends from

two points, the forehead and the vertex, ending at a line which, "carried round the head, would touch the occipital ridge posteriorly, and the eyebrows anteriorly." So with the beard, &c. In connection with a succeeding remark, that the eyebrows are a clinical region in brow ague, herpes, and leprosy, the case already referred to, of a woman who suffered in the night from a severe attack of tic, and found in the morning that the inner half of one eyebrow and the corresponding portion of the eyelashes were perfectly white, may be mentioned. Laycock points out the fact that the hair over the lower jaw is almost always gray earlier than that over the upper jaw, and that tufts on the chin generally turn white first (xlv, May 13, 1871).

Mr. Paget, in his 'Lectures on Nutrition,' has recorded the case of a lady with dark brown hair, subject to nervous headache, who always finds, the morning afterwards, patches of her hair white, as if powdered with starch. In a few days it regains its colour. Dr. Wilks says he has on more than one occasion had a lady visit him with jet black hair, and on the morrow, when seen in bed, it had changed to gray. Bichat, opposing the scepticism of Haller, asserted that he had known at least five or six examples in which the hair lost its colour in less than a week: and that one of his acquaintance became almost entirely blanched in a single night, on receiving some distressing news. There is no reason to call in question the statement that Marie Antoinette's hair rapidly turned gray in her agony. We have it on the authority of Montesquieu himself that his own hair became gray during the night, in consequence of receiving news of his son which greatly distressed him. Dr. Laudois, of Griefswalde, reported not long ago a case in 'Virchow's Archives,' in which the hair turned rapidly white. But I have not any particulars at hand beyond the fact that on carefully examining the hair, he found that there was "an accumulation of *air-globules* in the fibrous substance of the hair." Erasmus Wilson read a paper at the Royal Society in 1867 on a case of much interest, a *résumé* of which I subjoin in a note.*

* Every hair of the head was coloured alternately brown and white from end to end. The white segments were about half the length of the brown, the two

The falling off of the hair is too frequent a result of anxiety, or other depressing emotion, to escape common observation. A case reported in the 'Lancet' of May 4, 1867, forms an excellent illustration:—

A man of nervous temperament began business as a draper in 1859. At that time he was 27 years of age, in good health, though not very robust, unmarried, and had the usual quantity of (dark) hair, whiskers and beard. For two years he was in a state of *perpetual worry and anxiety of mind*, and his diet was very irregular. Then his hair began to come off. He declares that it literally fell off, so that when he raised his head from his pillow in the morning, the hair left on the pillow formed a kind of cast of that part of his head which rested on it. In a month's time *he had not a single visible hair on any part of his body*—no eyebrows, no eyelashes; even the short hairs of his arms and legs had gone; but on the scalp there could be seen, in a good light, patches of very fine short down. This was in 1861. Medical treatment proved of no avail, and he was finally advised to do nothing. So long as his anxiety continued, the hair refused to grow, but by the latter part of 1865, his business became established, and, coincidently, his hair reappeared, and when Mr. Churton, of Erith, reported the case, he had a moderately good quantity of hair on the head, very slight

together measuring about one third of a line. Mr. Wilson suggested the possibility of the brown portion representing the day growth of the hair, and the white portion the night growth, and this opinion was corroborated by the remarks of Dr. Sharpey and others of the Fellows who took part in the discussion. Under the microscope, the colours of the hair were reversed, the brown became light and transparent, the white opaque and dark; and it was further obvious that the opacity of the white portion was due to a vast accumulation of *air*-globules, packed closely together in the fibrous structure of the hair, as well as in the medulla. There was no absence of pigment, but the accumulation of air-globules veiled the normal colour and structure. Mr. Wilson observed that as the alteration in structure, which gave rise to the altered colour, evidently arose in a very short period, *probably less than a day*, the occurrence of a similar change throughout the entire length of the shaft, would explain those remarkable instances of which so many are on record, of sudden blanching of the hair; and he ventured to suggest that during the prevalence of a violent nervous shock the normal fluids of the hair might be drawn inwards towards the body, in unison with the generally contracted and collapsed state of the surface, and that the vacuities left by this process of exhaustion might be suddenly filled with atmospheric air (xlvii, April 20th, 1867).

whiskers, rather better eyebrows, and the eyelashes pretty good.

The influence of painful emotions in causing gray or white hair, and alopecia, has been sufficiently illustrated, and it would have been interesting to adduce a reverse series showing the opposite effects of Joy. But it is a very different thing to restore to its healthy habit, the function of a tissue whose pigment has been removed by slow mal-nutrition, or by sudden shock. I may adduce such a circumstance as the following, however, as described to me by the same medical man who attended Thomas W— (p. 289), to show that hair which has turned gray in the natural course of life, may, by the stimulus of specially favorable events, become dark and plentiful again.

An old man (æt. 75), a thorough out-and-out Radical—even the cancelli of his bones were so impregnated with a thorough disgust of the Government of George the Fourth that he threw up a lucrative situation in one of the Royal Yards, and compelled his youngest son to follow his example—insisted that his wife, also aged (about 70), toothless for years, and her hair as white as the snow on Mont Blanc, should accompany them to the land where God's creatures were permitted to inhale the pure old invigorating atmosphere of freedom. About six or seven years after their departure, a friend living in New York gave an excellent account of their proceedings. Not only could the old man puff away in glorious style, and the son do well as a portrait painter, but old Mrs. —— had cut a new set of teeth, and *her poll was covered with a full crop of dark brown hair!*

Teeth.—Many observations might be made in reference to the nutrition of the teeth; but I must content myself with adding to the favorable results stated in the last case, a single example of the effect produced by unfavorable influences. "I have recently known," says Marshall Hall, "the teeth to decay in an extraordinary manner in a few weeks, as the effect of painful emotion, more allied to Fear than any other" (xvii, p. 40).

CHAPTER XI.

INFLUENCE OF THE EMOTIONS UPON THE ORGANIC OR VEGETATIVE FUNCTIONS (*continued*).

Passing on to the influence of the emotions on *Secretion,* we commence with the sudoriferous glands.

Sweat.—The ordinary action of mental excitement in accelerating the cutaneous circulation and secretion is familiar enough. The state of the system may be aroused by painful, no less than by pleasurable emotion. For example: when Warren Hastings was thrown into a passion by his recall home, we are told that "the sweat ran down his face" in an extraordinary manner. Of interest in connection with an experiment of Bernard, in 1851, which showed that division of the cervical branch of the sympathetic in the horse caused increased perspiration on the corresponding side, is the record by Gratiolet of a case in which emotional excitement had the effect of causing the perspiration of the head to be afterwards limited to one side. The sweats of terror are cold. The vaso-motor nerves are so influenced as to cause the capillaries to contract, the temperature is lowered, and insensible is converted into sensible transpiration. If the amount is actually increased, there is probably an escape of fluid rather than augmented secretion. Checking of secretion is seen in emotional anasarca. Many medical authorities have referred to the fact of anasarca following violent emotion of a painful character (innervation lowered). Bateman witnessed the extraordinary influence of alarm upon a poor woman; a sudden universal anasarca following, in one night, the shock occasioned by the loss of a small sum of money, which was all she possessed ('On Cutaneous Diseases,' p. 150). Copland classes such

cases under "primary asthenic anasarca;" the vital tone of the small vessels being lowered, the excretory function of the skin is suspended, and serous effusion from the blood-vessels follows. Why, in some, this serous effusion remains in the cellular tissue, and in others is poured forth through the ducts, it is difficult to say. Possibly spasm of the ducts may have something to do with it. In the following instance, related to me by Mr. Cocks, a very large amount passed away through the ducts; and it becomes a question whether Fear in this case did not act simply in exciting the sudoriferous glands to excessive action. The man's fear was of an anxious, fidgety kind, which was more likely to arouse than to check the function of the glands. Such a case is full of interest and instruction.

John Ford, an officer in the Royal Navy, in George III's time, was invalided home from the West Indies for dropsy. Twelve months afterwards he was discharged from the Naval Hospital as incurable, from which date to the time when first seen by my friend, he was under the paternal medical care of a host of ichneumons, who fed on the exchequer of his profits *secundum artem*. As to the disease, it was a matter of no moment—the longer he lived to swallow their trash, the better for them. "They looked on and grinned, grinned and looked on again." Mr. Cocks says he found him propped up in bed at an angle of 60°, with an anxious and cadaverous countenance. The room was neatly and profusely embellished, not with pictures, but with empty physic phials, pill boxes, and gallipots. He had been well drugged; his system was saturated with nearly nine tenths of the articles mentioned in the Materia Medica. My friend advised him to throw physic to the dogs, for the present, and to submit to the only remedy (in his case) to save life, a *surgical operation*, and that as speedily as possible. This roused him from his lethargy; it was like a powerful electric shock. Alarmed, he shook like a poor wretch under the influence of the cold stage of ague. In a subdued voice, he said (as his excitement partially subsided), "I never can submit to an operation; I would rather die!" "If that be your determination," it was replied, "your case may be considered hopeless; all the drugs in the world will not save you. At all events I will visit you to-morrow morning

to know your decision." Accordingly Mr. C. called on him, but the scene was changed. Soon after his departure, he appeared to be greatly distressed both in mind and body; groaned aloud, wept much, and was very restless. The word "Operation" had worked wonders—in fact, a miracle. A copious *perspiration* was produced, and the steam, like that from boiling water, issued from every pore in the skin. The nurse said that more than two gallons of fluid had passed from him during the night. The bedding, consisting of feather-bed, mattress, blankets and sacking, were saturated through and through with serum, and the floor was flooded with it. The patient recovered, and was appointed to a ship in commission going to Jamaica. Two years after, he died from the effects produced by yellow fever, was buried in one of the "Campos santos," and was no doubt eaten by the land crabs in less than a week.

During the "sweating sickness" in the 16th century, Fear, as might be expected, frequently induced excessive action of the skin without the development of all the graver symptoms. "Many an one sweats for fear and thinks he has the English sweat, and when he afterwards hath slept it off acknowledges that it was all nonsense" (Bayer von Elbogen, lxix, p. 259).

Sometimes, however, on the mere mention of the subject "amidst a circle of friends, first one and then another was seized with a tormenting anguish, their blood curdled, and certain of their destruction they quietly slunk away home and there actually became a prey to death" (loc. cit.).*

Sir H. Holland records the case of a gentleman, æt. 36, and of good health, except that, "on the slightest exertion of speaking, eating, or emotion of mind, sweat broke out profusely in drops from the right side of the face, strictly defined by the median line, the other side remaining in its natural state. The complaint had existed four or five years, coming on without obvious cause" (xvi, p. 178). This one-sided affection is, when the result of central emotional origin, of especial interest.

Some emotions affect the cutaneous secretions, not only in regard to amount, but odour. In this and the vitiated intes-

* "..... animos omnium terrore perculit adeo ut multis metus et imaginatio morbum conciliarît" (Erasmus).

tinal secretions which occur when Fear acts powerfully upon the system, it is reasonable to connect what in man appears to be a useless, and indeed highly inconvenient result, with the analogous occurrence in animals in which flight from the pursuit of the enemy is often secured.

Urine.—The curious influence upon the renal secretion (or upon the power to retain it) of a sound which grates upon the mental ear of the listener, referred to by Shakespeare in the well-known passage in reference to the bag-pipe is, we presume, exceptional.

The action of mental anxiety or suspense (not fright) in causing a copious discharge of pale fluid is familiar enough to all, especially to the medical student about to present himself for examination, the amount being in a pretty direct ratio to his fear of being plucked. The frequency of micturition may, however, arise from nervous irritability of the bladder without increased, or even with diminished secretion. Still, the action of the skin is usually checked, the extremities are cold, and the kidneys have to pump off the extra amount of fluid retained in the circulation. Müller calls it an example of "suppression of the urine," and though this seems paradoxical, there is in fact a non-elimination of the substances usually separated from the blood, compared, at least, with the aqueous character of the whole excretion. Of complete emotional suppression of urine, I do not know an instance. The odour may be affected by the emotions, in man as in animals.

The alleged changes in the chemical composition of this secretion, the result of mental disturbance, are of much interest, but the sources of fallacy in their investigation are great, and may lead to very erroneous conclusions. Dr. Prout, in his 'Stomach and Renal Diseases,' states that the depressing passions, particularly Anxiety or Fear, will in many predisposed individuals cause a deposition of the triple phosphates in the urine. In adducing proof that the functional activity of the nervous tissues causes its disintegration by the agency of oxygen (in the blood) Dr. Carpenter refers to the increase of alkaline phosphates in the urine after much wear of mind, whether emotional or intellectual, and alludes to "more than one case of this kind occurring among young men, whose anxiety for distinction had

induced them to go through an excessive amount of intellectual labour during their student life, and who found themselves forced to pay the penalty of that excess in a subsequent prolonged abstinence from all mental occupation involving the slightest degree of effort" (viii, p. 352). It is impossible to say in such cases how much of the cause is emotional and how much purely intellectual. With regard to observations on the state of the urine in the insane, which have from time to time been made, they are somewhat contradictory, and there is the difficulty of determining the priority of the mental and physical phenomena. Those of Drs. Sutherland and Rigby would accord with what one might expect from the foregoing statements, while those more recently made by Dr. Adam Addison, and conducted with great care, lead to a different result, although confirming the conclusion that during a maniacal paroxysm the urine is very acid, scanty, and of higher specific gravity. The former observers found a plus quantity of phosphates in acute maniacal paroxysms; denoting increased expenditure of nervous force, not inflammatory action. Also, a minus quantity in the stage of exhaustion of mania, in acute dementia, and in the third stage of general paralysis. Drs. Sutherland and Rigby regarded these results as in harmony with analyses of the brain and the blood; a plus quantity of phosphorus being found in the brain, and a slight excess of albumen in the blood of maniacal patients, and minus quantities of these substances in the brain of idiots, and a minus quantity of albumen in the blood of general paralysis.

Dr. Addison eleven years later repeated these experiments, but took into account what Drs. Sutherland and Rigby omitted to do, the amount of urine discharged in a given time. The result was, he found the quantity of phosphoric acid excreted in cases of mental excitement to be less than after convalescence. "This," he adds, "is perhaps the most important fact elicited by the investigation, for a greater than the average excretion of the phosphates has come to be regarded as a pathognomonic phenomenon of maniacal excitement."

With regard to cases of chronic melancholia and monomania of fear, Dr. Addison observes that, according to the prevalent theory, one would have expected a large excretion of phosphoric

acid as the consequence of mental anxiety, but such does not appear to be the case." In dementia the amount of phosphoric acid did not differ widely from that of health.

Dr. Addison thinks that these and other facts "suggest that the quantities of the urinary constituents excreted under such conditions, are not to be regarded as anything like an absolute measure of tissue change; that, in fact, large amounts may be retained in the blood from want of water to dissolve and wash them out." The condition and weight of the body appear to affect the excretion of phosphoric acid more than the action of the brain. As regards the influence, therefore, of mental excitement upon the urine, we cannot, with these observations before us, speak any longer of an excess of phosphates in mania.

The observations of Drs. Sutherland and Rigby showed an excess of urea in mania, melancholia, and dementia, especially in melancholia; but Dr. Addison found that the excretion of urea was, without exception, diminished during a maniacal paroxysm. In melancholia (eleven cases) the amount was, in two cases, about normal, in the remainder below the healthy standard, while in dementia it ranged above and below the normal mean of health.

It is satisfactory to turn to some points in which these observers agreed. They all arrived at the conclusion that the amount of urine was less in maniacal excitement than in health, a decrease which "appears to have an inverse relation to the rapidity of development and the intensity of the paroxysm, for in the milder cases it is not nearly so great" (due, at least, in part to the increased action of the skin from muscular excitement). They also found the specific gravity raised in mania. Further, as respects acidity, Dr. Addison's results were identical with Dr. Sutherland's; the reaction proved acid—"very intensely so in the more severe forms" (xxi, July, 1865).

The influence of certain mental states, if prolonged, in causing diabetes appears to be clearly proved. Watson specifies "distress and anxiety," and Copland "great mental exertion and the depressing passions." Claude Bernard's experiments on the vaso-motor nerves and the centres which control them, in explaining the pathological symptoms which arise from the

changes induced in the nervous system by definite surgical lesions, show, also, how the emotions may produce the same results.*

Dr. Dickinson's *post-mortem* examinations of cases of diabetes have confirmed these observations. He found, first, dilatation of the arteries, followed by degeneration of the nervous substance external to them, and vacuities, which were most marked and constant in the vicinity of the median plane of the medulla, the gray matter of the floor of the fourth ventricle, and, in particular, a spot just internal to the origin of the facial nerve. Lockhart Clarke has observed degeneration of the floor of the fourth ventricle, and erosion of the calamus scriptorius, with destruction of the nuclei of the vagus; also cavities at the root of the facial nerves. Dr. Dickinson concludes that the nervous changes are antecedent to and productive of the glycosuria, and that diabetes is primarily and essentially a nervous disease (xlv, March 19, 1870).

In Hebrew and Greek the kidneys are frequently employed in a metaphoric sense: "I was pricked in my reins," "my reins shall rejoice," "I try the reins," are a few of the many illustrations which may be cited from the authorised version of the Old Testament. In the New, the same metaphor is made use of, "Know I am he that searcheth the reins," *νεφροι*. Parkhurst observes *in loco*: "as experience shows that the workings of the mind, particularly the passions of joy and fear, have a very remarkable effect upon the reins or kidneys, so from their retired situation in the body, and their being hidden in fat, *νεφροι* is used in the New Testament for the most secret thoughts and affections of the soul." The latter sug-

* A wound is inflicted on a portion of the anterior surface of the fourth ventricle; the abdominal circulation is suddenly accelerated, and the vessels in this region become turgid, just as if the sympathetic had been divided. Acceleration of the corresponding secretions is the result, and the flow of urine is much increased. Albuminuria sometimes accompanies this flow, and sometimes diabetes mellitus. "This is the case when the circulation of the liver has been also accelerated." The presence of grape sugar in the urine is thus referred to the acceleration of the hepatic circulation, more of the amylaceous substance which is produced by the liver and afterwards converted into sugar being formed, than the system can dispose of in a given time, and this surplus being excreted by the kidney. (Cl. Bernard; xlv, April 27, 1861.)

gestion is, I think, rather a doubtful one; however, whether correct or not, there remains the use of the word, derived, manifestly, from the influence of the emotions, including the Imagination, upon the renal secretion, and, perhaps, the lumbar region. It is rather remarkable that our language supplies no corresponding metaphoric term.

Saliva.—We have spoken of the influence of simple ideas upon the secretion of saliva under "Intellect," and will now refer to the alleged influence of Anger on the quality of this secretion.

Bichat entertained no doubt that Anger and Love do inoculate the saliva with something "qui rend dangereuse la morsure des animaux agités par ces passions, lesquelles distillent vraiment dans les fluides un funeste poison, comme l'indique l'expression commune" (li, p. 43). The saliva of an enraged animal and the venom of a viper are, according to Eberle, essentially the same.

In the 'Lancet' for July 14, 1860, is the report of a case of a boy, æt. 9½, who was bitten by a boy in anger. There was no evidence of rabies, but the boy died. He was seized with hydrophobia forty eight days after the bite, and died in 24 hours. Trousseau quotes from Van Swieten the case of a young man who died of rabies after having bitten his own finger in a fit of anger. Also that of an old woman who died with all the symptoms of rabies, after she had received a wound from a cock in a passion. He observes that Van Swieten could not admit that a virus, which was not present in an animal, could by it be communicated, and, therefore, conjectured that the cock had been bitten by a mad fox. This seems rather far-fetched; but it is difficult to understand why anger does not more frequently affect the saliva, and poison those who are bitten by angry persons or animals. Of these cases, however, and in one cited by the same author from Malpighi, who asserts that his own mother died of hydrophobia a few days after being bit by an angry epileptic, the true interpretation may be, not only that the character of the secretion was altered, but that those who were bitten were in a peculiar condition of health at the time.

Gaubius records several cases. A soldier quarrelled with a woman, who thereupon bit his hand. He was seized with rigors

and died. An enraged Italian youth, unable to revenge himself, bit his own hand and was seized with a deadly fear of water, as if bitten by a rabid dog.

Gaubius confessed himself unable to explain how "such pestilent corruptions of the fluids are so suddenly excited." In reference to this observation, Prochaska admits that it is quite possible that the nerves, irritated by anger, may by virtue of their influence over the secretions render them impure, although we cannot determine in what this impurity consists (i, p. 421). While Anger increases and poisons this secretion, Fear checks or suspends it, as is indicated by the parched mouth.

Speaking of the salts of the saliva, Mr. Wilkinson (xlix) forcibly says, "they become as different at different times and in different persons, as the billing of the dove from the bite of the rattlesnake, or the sweetest milk from deadliest poison. There is saliva full of care and sourness, which eats, not the food, but the stomach itself. There is saliva charged with contempt, which is spit upon meanness, and carries the badge from soul to soul where it lights. There is the saliva of disgust, which is vomited from the loathing blood, and avenges our disgust upon the ground. There is the spittle of self-complacency, elicited by the happy tongue, and too good not to be swallowed. There is the saliva of rage, which foams violently forth upon the beard, and that of haste and hurry, which froths and sputters. There is the saliva of grief, hard to get down, and full of choking. There is the mouth of fear, from which the saliva is frightened, and the dry tongue cleaves to the palate."

Gastric Juice.— Pleasurable emotions increase the amount of gastric juice secreted, the opposite effects being produced by depressing passions. Dr. Beaumont found in the man with the fistulous opening into the stomach "that anger or other severe mental emotions would sometimes cause its inner or mucous coat to become morbidly red, dry, and irritable; occasioning at the same time a temporary fit of indigestion" (xliii, p. 22). In dyspepsia, which constitutes so forcible an illustration of the influence of abnormal mental conditions, a change in the character or amount of this secretion, may or may not be the principal cause, but that morbid feelings acting directly on the stomach through the pneumogastric and sympathetic nerves, do form one

important element in the psychical genesis of the dismal symptoms comprised under this term, cannot admit of doubt.

Claude Bernard, in his lectures in 1860, showed that taking the two nerves of which the solar plexus is composed—the vagi and the sympathetic—as those which influence the digestive process, galvanism of the vagi excited secretion of the gastric juice, while the same stimulus applied to the sympathetic arrested it. "We therefore meet with two orders of nerves in the stomach as in the case of all other glands: motor nerves which accelerate the secreting process, and organic nerves which oppose it. In accordance with the above, Dr. Rutterford, Professor of Physiology, King's College, found that division of the vagi during digestion caused blanching of the mucous membrane of the stomach (xxxii, May 20, 1870). We have every reason to suppose that the emotions act powerfully upon the digestive process through the nerves composing the solar plexus; the depressing emotions contracting, and the exciting motions dilating the capillaries of the stomach. Whether a depressing or painful emotion, Fear, for example, contracts the vessels by stimulating the sympathetic nerves or by paralysing the vagi, may be doubtful, but the probability would seem to be that it suspends the action of the latter and allows the former full sway. (See Summary at the close of this chapter, and also the remarks on the action of the vagus on the heart in connection with the emotions.)

Fletcher in his "Sketches" mentions a barrister who enjoyed perfect health except when anxious during the assizes. Then the tongue became brown, the appetite vanished, and if food was taken, severe pain in the stomach succeeded. His anxiety once removed, his tongue cleaned, and "his appetite, a distinguished one, returned with such uncontrollable force, that this limb of the Law stops at a half-way house in his return home, when the limb of an animal less dangerous than himself satisfies, in some measure, the capricious humour of his otherwise most respectable and certainly very capacious stomach" (lxxiv p. 19).

Brierre de Boismont records the case of a convict who was greatly surprised and distressed with the verdict he received. Gastric and hepatic symptoms followed, and it was thought he would die. He was removed from the prison. He scarcely

took any nourishment, and suffered from continual nausea, and frequent vomiting, the matter thrown up being chiefly mucus. Organic lesion of the stomach and hepatic tumour were diagnosed. In a week, however, he improved; he was able to take a few spoonfuls of soup, and he eventually recovered. He said (and his doctors agreed with him)—"Si j'etais resté huit jours de plus dans la prison, j'etais un homme mort" (xxxv, 1853).

Bile.—Popular opinion connects bile and bad temper or melancholy together, perhaps more thoroughly than any other psychical and physical facts, the supposed order of events being sometimes psycho-physical, and at others physico-psychal. This latter is implied when we say that a man displays a great deal of bile, and from the same cause originates the word choleric. Homer speaks of the χολος of Achilles in the 'Iliad' (ii, 241).

"Achilles bears no *gall* within his breast."

And it may be noted, as marking the interchangeableness of bodily and mental terms, that it is as fitting to speak of "the gall of bitterness" as the bitterness of gall.

The Latin poets abound with references to the connection between the liver and the emotions, as in Juvenal:—

"Quid referam quantâ siccum jecur ardeat irâ?"

But such passages bear more especially upon the supposed seat of Anger in this organ—an idea mainly springing, however, from the influence of the mental states upon the viscera. It was not Anger alone which was supposed to be connected with the liver. The "jecur ulcerosum" of Horace was induced by Love. Plautus terms this feeling "morbus hepatarius;" Solomon speaks of the misguided youth in whom "the dart" of passion "strikes through his liver." It is to Grief that Jeremiah alludes when he complains, "my liver is poured upon the earth."

Gaubius, in asserting that the natural properties of the juices may be so altered that, with astonishing rapidity, the bland becomes acrid, and the salubrious hurtful—nay, virulent—asks, "Do you doubt it? I give you the example of an hysterical woman who, in a passion, vomits vitiated bile of every colour and acridity." Dr. Carpenter remarks that it is "perhaps not

an ill-founded opinion that melancholy and jealousy have a tendency to increase the quantity, and to vitiate the quality of the biliary fluid," and that "it is certain the indulgence of these feelings produces a decidedly morbific effect by disordering the digestive processes, and thus reacts upon the nervous system by impairing its healthy nutrition" (viii, p. 982). The influence of sudden fright in checking the secretion of bile, and so occasioning jaundice, is adduced by Bichat as a striking proof of the connection between mental states and the secreting organs. Emotional jaundice, like emotional cholera, may, as already stated (p. 272), be also caused by abnormal action of the muscular coat of the gall-duct and the intestines, and it would be hard to decide, in a given case, to which division to refer the symptoms. Dr. Budd, in his "Diseases of the Liver," observes that jaundice, following mental shock, long continued anxiety, or grief, is often unattended by any alarming symptom, "but, now and then, after it has existed for some time without any symptoms indicative of especial danger, disorder of the brain, which proves rapidly fatal, comes on. After death in such cases portions of the liver are sometimes found completely disorganised. *It would seem that some virulent poison is generated in the liver*, which deranges and then paralyses the brain, and after death comes softening and disorganisation of the liver itself" (p. 478). Dr. Wilson Philip asserts that depression of mind, if protracted, alters the structure of the liver. Dr. Badeley records the case of a certain great military officer who left England at an advanced age, to take possession of his office, without his lady, and without even bidding her farewell. As soon as she heard of his departure, she almost immediately became yellow, took to her bed, refused all food and medicine, and died in a very few weeks (xc). Dr. Anthony Todd Thompson states that "a young man in Paris had a musket pointed at his breast; he became suddenly deeply jaundiced, for which he was taken to a hospital and died."

Passing from the liver we may here refer to the *spleen*, which in our language is so frequently employed metaphorically. A fretful person is splenetic, spleenful, or spleeny (Shakespeare); a mild and gentle person, spleenless. In a curious old book, the 'Breviary of Health,' published in 1552 by Andrew Borde,

the writer, after observing that "melancholy meats, hard chese, and feare is not good for the spleen," adds, "in English it is named the passion of the splene. The cause of this impediment: This impediment doth come by thought, anger, or care, or sorrowe, of imprysonment, of feare and dreade, and for lack of meat and drynke. And it may come of great solytudnes, or solytudnesse to study, or to be occupied about many matters. *A remedy*: The chiefest remedy for this matter is to use honest and mery company, and to be iocunde and nat to muse upon no matter, but to leaue of al pleasure and nat to study upon any supernaturall thynges, specially those thynges that reason can not comprehende, nor use not to lean or stoupe downe to write or ride, and beware of slepe the afternone and use the medicines the which be expressed in the chapitre named Splen" (Antiquarian Notes, in the 'Athenæum,' Sept. 16, 1871).

Intestinal Secretions.—Apart from muscular action, defecation may become urgent, or occur involuntarily from various causes, one being the increased secretion from the intestinal canal, as from Fear, and in some cases from the altered character of the secretion itself. While in this respect the influence of Fear may be inconvenient in man, it naturally assists escape in some animals, as the polecat.

Certain cases of choleraic diarrhœa (although, of course, complicated with other pathological states) may be referred to here.

The story of the Russian convicts under sentence of death, some of whom were placed in beds falsely said to have been occupied by cholera patients, will occur to the reader. Mr. G. Smith reported in the 'Lancet' of Aug. 4, 1866, the case of a fine hale blacksmith under surgical treatment in King's College Hospital, who carried down the bed on which a cholera patient had died. He sat up until late, brooding over what he had done and its probable consequences. He died next morning of cholera. Those, however, who believe that cholera is contagious would not admit that, in this case, Fear was more than the exciting cause of the attack.

When, some years ago, the cholera was prevalent at Newlyn, a fishing village near Penzance, intercourse was forbidden between the two places. One day a man entered the shop of a

barber in Penzance, and was shaved. On leaving, some one, who had recognised him, asked the barber if he knew whom he had been shaving. He replied, he did not. "Why, he's a man from Newlyn!" It was enough. The terrified barber was seized with cholera, and died within twenty-four hours.

Mr. ——, of Falmouth, some years ago, had the cholera. When well, he went to the Lizard for change. The woman who opened the door of the house to which he went, having heard that he had had the cholera, was exceedingly alarmed, and had an attack herself.

Catamenia.—It would be tedious to enumerate even a small proportion of the cases which are on record, showing the influence of moral causes on the suppression of this secretion. Disappointed affections, every one knows, are a fruitful cause, and in such instances there can be no confusion between cause and effect. The sequence of the phenomena is also clear when Rage operates, as in a case recorded by Brierre de Boismont, of a lady who was thrown into a furious passion by some circumstance, in consequence of which suppression took place. Remedies failed to relieve her, and she became insane. Regarded as possessed, she was exorcised, but without effect. Subsequently, medical treatment restored the uterine functions, and, concurrently, her mental health (xxxv, 1851, p. 593).

Milk.—The influence of emotional excitement on the secretion of the mammary gland is generally recognised, and there is no difficulty in meeting with cases which forcibly illustrate it. A few striking examples must suffice.

Descuret states that during a period of four years, a young woman suddenly lost her two children and a foster-child from giving them the breast immediately after being in a violent passion (lxvi, p. 56). He also cites from Parmentier and Deyeux, that after powerful emotional excitement, the mammary gland secretes an insipid yellowish serous fluid, instead of one possessing its normal white saccharine character. Copland cites from Graeffe the very striking case of a woman who received a fright a week after delivery. This caused complete suppression of the milk, followed by ascites and anasarca. Paracentesis was performed; "a bucket of fluid resembling whey, and exhaling an acidulous odour, was drawn off. Upon being boiled with dilute

sulphuric acid, it furnished a substance resembling casein. When tapped six weeks afterwards, the fluid was of a greenish yellow, and without the least trace of casein" (lxx, I, p. 189).

Dr. Kellogg, of Port Hope, Canada West, gives the following cases :—

"Not long since, I was called to see a child aged seven or eight months, which up to a short time before my being sent for, had been in a most thriving condition, exceedingly healthy and robust. I found the child in a state approaching complete coma, in a condition much resembling that which results from hydrocephalus, or anæmia of the brain, as the result of some exhausting disease. It had suffered none such, however; and as the coma had come on suddenly, constipation of the bowels only having been observed as its forerunner, I felt puzzled to determine the true cause. After, however, a free action of the bowels, for which large doses of cathartic medicine were required, it rapidly regained its consciousness, and after passing dark green stools for a number of days, completely recovered. The mystery which shrouded this case, and which I was not able to unravel at first, was soon, however, explained, for in conversation with a near neighbour I learned that the mother, who was a woman of very violent temper, had for a number of days been giving way to most intense paroxysms of rage, which had been expended upon her husband for selling a piece of property against her wishes. During all this time she was nursing her child. I immediately requested the mother, if she wished to rear her offspring, of which she was passionately fond, to suspend nursing it under such a state of mental excitement; and if she could not control herself, and make up her mind to be quiet and cheerful, it would be advisable to wean the child, or employ a wet nurse, while giving the reins to her passion, and not allow its force to be expended upon the frail being who was innocently drawing its nourishment from her bosom. She appeared to feel the justice of the reproof and was, doubtless, more careful for the future, as the child did well, though not weaned for several months after this occurrence.

"Another lady of a highly excitable temperament, the mother of three children and who had frequently been under the medical care of the writer, gave birth to her first male child about one year since. The child was healthy, and appeared to thrive well

for four or five weeks. Its mother, on first leaving her room, was, as is frequently the case with careful housewives, somewhat excited and vexed with the condition of things in the kitchen, and the 'high life below stairs' which had evidently been led by the servants during her confinement. She was also excited, on the same day, by the arrival of some friends. In addition to this, after retiring to her room, she heard the child next in years to the infant fall down a flight of stairs. She was much alarmed and had the child brought up to her room, screaming, with its nose bleeding and broken. She took it upon her lap, bathed its face, and after stanching the hæmorrhage and quieting the child to sleep, she, most imprudently, and, though a highly intelligent person, ignorantly and innocently suffered the infant to nurse after this crowning excitement of the day. Its bowels became immediately deranged, the stools green, high fever and convulsions supervened, and the child died in great agony in less than three days, with all the symptoms of violent inflammation of the bowels" (lxxviii, April, 1856, p. 313).

Dr. Kellogg observes, "I am confident that I have frequently seen the death of the nursing infant result from ignorance of the mother of the extraordinary influence of mental emotion upon the secretion of milk."

Tears.—The secretion of the lachrymal gland is, we know, excited by joy (and tender emotions) as well as by grief, its natural excitant.

> "Back, foolish tears, back to your native springs—
> Your tributary drops belong to woe,
> Which you mistaking, offer up to joy."

We must confess with Brodie that we are unable to answer so simple a question as, why or how does a certain state of mind augment the secretion of this gland? Gratiolet inferred, partly from his own sensations, that tears result from reflex irradiations which traverse the fifth pair of nerves; that is to say, the emotion of Joy or Sorrow acts first upon the heart or other viscera through motor channels, and is then reflected upon the sensory nerve supplying the gland. But this track does not seem anatomically or physiologically probable. Much more likely is it that the influence is transmitted directly either to the

capillaries of the gland by actively dilating motor nerves, or through nerves to the lachrymal cells themselves, directly exciting their functional activity.

The *quality* of the secretion seems to be altered by powerful emotions, the saline ingredients being increased, causing "a strong brine."

Lastly, the secretion may be checked. The intensity of the feeling or the suddenness of the sorrow is the most frequently witnessed cause. Daily observation shows that the first result of distressing intelligence is the negative one—inability to cry. See, too, what the want of a handkerchief may do. "I went," says Hunter, "to see Mrs. Siddons acting; I had a full conviction that I should be very much affected, but unfortunately I had not put a handkerchief in my pocket, and the distress I was in for the want of that requisite when one is crying, and a kind of fear I should cry, stopped up every tear, and I was even ashamed I did not, nor could not, cry" (Posthumous Papers, vol. i, p. 557).

Exhalation and Absorption.—As all dropsies may be referred to increased exhalation or diminished absorption, we would briefly refer under this head to two cases illustrative of the influence of emotional excitement in checking and exciting these functions. The influence of the sympathetic nerves upon absorption has been demonstrated by Bernard; their division accelerating, and galvanism suspending the process.

Dr. Py, physician to the hospital at Narbonne, reported in the 'Gazette de Santé' the case of a boy, æt. 11, in whom ascites occurred under the following circumstances:—Pierre Peyrel, having lost his father, imagined in a dream that he returned and embraced him, which gave him a great fright. He was a pupil at the "Hotel de la Charité," and the officers of the establishment were surprised next morning to find the abdomen distended (*enflé du ventre comme un ballon*), as the lad had played and taken his food as usual the preceding day. He was found by the doctor to be feverish, the pulse small and hard, and the abdomen painful and tender. Medicines having failed to remove the effusion, the surgeon to the hospital drew off ten pints (Paris measure) of clear fluid, the cure being completed by local frictions and diuretics.

In the following case of ascites, for the genuineness of which I can vouch, the fluid was rapidly absorbed, and the action of the kidneys increased :—

A woman, aged about 45, was attended by Dr. B—, in a small town in Devonshire. He found medicines perfectly useless, and was, therefore, determined to try his hand (his first essay) at paracentesis. He intimated to the patient what he intended to do on the following morning, which alarmed her much; in fact, nearly frightened her out of her wits. He invited two of his medical friends to assist him in the operation. The trio were duly ushered into the sick room—but no operation! The fluid had vanished, discharged chiefly by the bladder. They found the poor creature exhausted, blanched and as thin as a lath. The abdomen was bandaged, and the worthy doctors walked back to the surgery to consult, and unriddle the mystery.

A passing reference may here be made to the influence on pulmonary exhalation of emotional states, the breath being rendered notably offensive by distress of mind, and to the acid eructations and flatulence, "partly exhaled from the digestive mucous surfaces" (Copland), which arise from the same cause. Of heartburn, an expression which receives an illustration from Shakespeare, indicates the popular belief. "How tartly that gentleman looks! I never can see him but I am heart-burned an hour after." Though mental heartburn only be implied, the metaphor is itself a recognition of the relationship between the two states—bodily and mental.

Before concluding the consideration of the influence of the emotions upon the organic functions, I wish to refer to several disorders of the system which are important illustrations of this influence, and which may, perhaps, be enumerated here more appropiately than in any other place; they should be studied in connection with the action of the vaso-motor nerves.

Fever.—According to Cl. Bernard, the early stage of fever marked by rigors is analogous to that which is artificially produced by reflex action upon the sympathetic, and consequent constriction of the vessels, by galvanizing the central termination of a cerebro-spinal nerve, this being followed by elevation of temperature in consequence of the vascular dilatation which succeeds the vaso-motor excitement. The latter febrile state

answers also to that caused by section of the sympathetic. "If," says Bernard, "we only suppose the generalization of the phenomena which we have observed as the result of the division of the ascending branch of the great sympathetic, we should have a true fever—increase of heat, a sense of oppression, rapid pulse, perspiration, brilliancy of the eyes, &c." "We have seen besides that on the side on which the sympathetic has been divided, the blood preserves its bright red colour while traversing the capillaries; the phenomena of nutrition do not take place. The same thing occurs in certain pathological states. Thus, since I made known my experiments, cases of malignant fever have been published in which the blood passed on into the veins, having the appearance of arterial blood, venous pulsation being also observed. In these conditions the sympathetic system is in a state similar to that in which section has been performed, a remarkable elevation of the temperature of the surface of the body being also present. But in these conditions there is also an equilibrium between the external phenomena of heat and the internal temperature. The hepatic and intestinal functions, the principal sources of animal heat, are no longer performed. The production of heat ceases in those internal organs whose functions are suspended, but is, on the contrary, very actively produced in superficial parts." M. Bernard adds that the increase in the fibrin of the blood in fever, is paralleled by what he has observed in animals in which the great sympathetic has been divided. The general inference drawn from these facts by this physiologist as to the nature of fever, is very important in its bearing on the influence of the emotions upon its production, this inference being that "fever ought to be regarded *as a phenomenon purely nervous*. We may, in short, produce all the disorders of the organic functions which mark its course *by acting upon the nervous system, and upon it alone*" (lxviii, 1872, p. 347).

Many interesting observations were made by Dr. Rush on the "Bilious Yellow Fever" which raged in Philadelphia in 1783, and among the causes of attacks of this fatal malady he enumerates "a sudden paroxysm of fear." But while he observed this to be the case in many instances, he saw more remarkable examples of nervous or timid people escaping, although constantly

exposed to the miasmata. He conjectures that a *moderate* degree of Fear helped to counteract their injurious influence, a healthy equilibrium resulting from the opposition of two stimuli; but whether this explanation is satisfactory or not, his statement of fact which follows is of much interest. "I am certain," says he, "that Fear did no harm after the disease was formed, in those cases where great morbid excess of action had taken place. It was an early discovery of this fact, which led me not to conceal from my patients the true name of this fever when I was called to them on the day of their being attacked by it." Indeed, he goes further than this, and says, "Fear co-operated with some of my remedies in reducing the morbid excitement of the arterial system" (lxi, III, p. 49).

Attendants upon the sick, in this fever, were observed to be themselves materially influenced by the prospect of the patient's recovery. So long as there was hope, they often escaped. But when hope was extinguished, they were frequently attacked by the disease—most of the near relations of the deceased falling victims to it. On the other hand, an opposite state of mind to that of Grief also produced the disease, or rather rendered persons more liable to it. For after nursing a relative who recovered, many became affected in a few days, notwithstanding their joy, in consequence, no doubt, of mental collapse. Their hopes were fulfilled, attention upon an object external to themselves was no longer required, and a general relaxation of the energies followed, only too favorable to the invasion of fever. Dr. Jackson, in his 'Treatise on the Fevers of Jamaica,' states that the garrisons of Savannah and York Town remained healthy so long as those towns were besieged, while Savannah became affected when the French and American armies retreated from it, and York Town when it capitulated (lxi, III, p. 50). In both instances the mental tone of the inhabitants ceased to be wholesomely maintained; Joy in the former did not prevent the deleterious influence of the reaction, and Grief or Disappointment in the latter produced its natural fruits. So complex are psychical causes, that opposite events will occasion the same results, but when analysed there is no real inconsistency in their operation, and they fall under well-understood psychological laws. The perception and recognition of these laws by the

physician is important in the invasion of disease, especially of epidemics.

In the reports of cases of Continued Fever given by M. Andral, in his 'Clinique Médicale,' occurs that of a young man, æt. 22, whose disorder did not originate in Emotion, but whose death appeared to be hastened by Fear. The patient had been told that the plague reigned in the Paris hospitals. He was very much alarmed by this news (which was false), and he regarded himself doomed to inevitable death. The pulse became frequent after having improved, stupor appeared, and he died three days afterwards. Andral, commenting on this case, says, "When convalescent from a dothinentérite, a moral excitement acted on him; he all at once presented symptoms which indicated considerable disturbance of innervation. He died in a few days, and anatomy discovered neither in the nervous centres nor elsewhere any lesion whatever to account for the alarming phenomena which hurried him to the grave" (p. 782).

Smallpox.—Could merely dwelling strongly upon this disease, with the expectant dread of having it, really produce it? For example, would it be possible that the circumstance related in the following story should result from mental Emotion alone? Miss Tuckett, in her 'Beaten Tracks' (1865), says, "A woman, apparently miserably poor, with a sick child in her arms, had attacked some ladies who were driving in a carriage, and, finding her petitions unheeded, she flung her infant into the carriage, exclaiming with a fearful imprecation that her little one was ill with the smallpox, and she prayed Heaven to send the malady to these hard-hearted ones. It was only too true; the fearful disease was raging at the time, and whether from contact with the child or terror at the woman's words, I know not, but one of the ladies speedily sickened and died." Of course, as the disease was raging in that locality at the time, and there was actual contact between the child and the ladies, no inference can be drawn with safety; but it is very probable that the child was not labouring under the complaint, that it was a mere threat on the part of the offended mother, and that it had an effect; perhaps by depressing the spirits it predisposed the lady to take the prevailing epidemic.

A medical friend informs me that a near relation of his, a young lady about seventeen years of age, took the smallpox under the following circumstances. She was walking along the street and saw not far from her a child in the smallpox, much disfigured. It was a disagreeable object and made a strong impression upon her mind. She was taken ill, and suffered from as severe an attack of (confluent) smallpox as my informant had ever attended. It may be remarked that she lived at some distance from town, that variola was not prevalent, that she had been vaccinated, and that the distance between her and the child is supposed to have been about a yard. Still there was the possibility of her having caught the complaint, if not from the child, from other sources of infection in the town. Her revulsion or sudden fear may, however, have induced an attack which would not otherwise have occurred, although exposed to the variolous miasm. It is worthy of remark, as interesting in connection with the psychical element in the history of the disorder, that the lady has from that time been subject to epileptic attacks.

Intermittent Fever.—Nebelius was lecturing one day upon Medicine, the subject being a description of ague; one of his pupils (doubtless highly susceptible and nervous) became pale, began to shiver, and at last had all the symptoms of intermittent fever. He was laid up, had three or four paroxysms of tertian fever, and was cured by the usual anti-periodic remedies (lx, p. 295).

This is an admirable illustration of a fearful imagination producing the thing feared. And when we extend the examination of psychical disease-producing causes to those which induce disorders not connected with any disease in the person's mind, we find examples of ague induced by sudden fright which are strikingly illustrative of the morbid effects of this emotion. In the 'Annales Médico-psychologiques' (1851, p. 660) is reported a case of "Tertian Fever caused and cured by a vivid moral emotion" which falls under this category. A young lady, Mademoiselle Elisabeth, was engaged in needlework at the window when she saw a neighbour precipitate himself from the upper story of his house. She was instantly seized with nervous tremors which nothing served to lessen, and by their

persistence for some days occasioned her family great alarm. At last, under the treatment adopted—prolonged baths, antispasmodics, &c.—she became calm and was considered cured, when, on the approach of the catamenia, an attack of tertian fever supervened, "*parfaitement caractérisée.*" The attacks returned at the same periods in spite of appropriate treatment ("*le plus varié et le mieux indiqué*"). Her physician, Dr. Bouygnes, failed to modify the course of the disorder except in the intermediate time of uterine repose. We may add that she was cured by a purely psychical agent, the sudden return home of a brother, the captain of a vessel, who had been exposed to great danger in a voyage. Her emotion was so intense that she remained motionless, her eyes fixed upon him, and unable to speak a word. She afterwards said that at that moment she underwent an extraordinary change. The attacks of ague never returned.

The Duke of Norfolk, when suspected by Queen Elizabeth of conspiracy, and anxious to clear himself in her presence, found his heart fail him, and "fell into an ague, and was fain to get him to bed without his dinner" ('Froude's History,' vol. ix, p. 473).

Sir Samuel Baker, in his 'Albert Nyanza,' after describing the symptoms of the fever which prevailed and proved frequently fatal in Africa, and was of an intermittent type, observes that "any severe action of the mind, such as Grief or Anger, is almost certain to be succeeded by fever in this country" (vol. i, p. 394), just as full occupation of mind was found to act as a prophylactic against it.

Demangeon says he has known women nurse their own children in the smallpox without any feeling of repugnance, and not take the complaint, but the same persons having to nurse other children towards whom they felt differently—disgusted, in fact—caught it. Such instances serve to mark the different effects of contagious diseases upon those who come within their influence, according to their mental condition.

Rheumatism.—I have known two cases in which fright brought on a rheumatic affection of the joints. In one case a woman heard that her husband, who was at work in a

town at some distance, had had a severe accident. She was in good health at the time, and after the shock she had received, her wrists and ankles became swollen and painful. Ever since, a period of six years, she has been subject to more or less stiffness of the joints.

In the other case, a boy aged about 16 was alarmed by a drunken man who one night ran after him with a stick, but did not succeed in overtaking him. The boy on reaching home was pale and suffering altogether from nervous shock. Feverish symptoms followed, and several of the joints shortly afterwards became painful and swollen. When recovering from the attack he suffered a relapse from exposure to the air, and was laid up for some weeks. The case is very similar to several reported by Dr. Todd, which ended in chorea.

Gout.—Among the remote causes of this malady Dr. Rush enumerates "public and domestic vexation, the violent or long-continued exercise of the understanding, imagination, and passions, in study, business or pleasure;" and among the exciting causes, "a sudden paroxysm of joy, anger, or terror" (lxi, II, p. 149).

Dr. Badely says, "A friend of mine had a fit of gout brought on by fretting, and cured suddenly by the alarm of a house being on fire."

In speaking of the causes of gout, Sydenham, himself a martyr to it, observes that the disease follows the over-application of the mind to serious matters, and deep study.

"Melancholy, so-called, is pre-eminently the inseparable companion of gout. Hence, those who are liable to it are so wont to tire and overwhelm the animal spirits by long and deep thought, that excessive exertion of this sort, even without the artificial aid of reading, makes the proper preservation of the economy of the body an impossibility; for which reason (as seems to me) gout rarely attacks fools. Those who choose may except the present writer." (Works, Syd. Soc., vol. ii, p. 148).

To the foregoing I add an abridged report from Descuret of a melancholy instance of death caused by Grief, combined, perhaps, with Chagrin.

An English nobleman in Paris dismissed his coachman,

an old and faithful servant, because he allowed a miserable vehicle to pass his own equipage on the road. The poor man, soon becoming ill, was admitted at La Charité, when the *interne*, convinced that something preyed upon his mind, traced the cause of his symptoms to their root. He hastened to the house of Lord G—, and begged him to forgive his servant. "My lord," he said, "I have taken the liberty of coming to converse with you about a patient who interests me greatly. Consumed by the chagrin of having displeased your lordship, your unfortunate George is dying at the hospital." "George at the hospital!" interrupts the proud *Anglais*; "but this miserable man wishes still to dishonour me. Let him go out at once. I wish him to be treated at my expense, and to have all he wants." "Your generosity does not surprise me, but your George cannot be removed; he only requires one thing to make him die happy, and that is that your lordship will come and pardon him." "I see George and pardon him! But you cannot know that he has disgraced me by allowing me to be passed on the road by a *fiacre*." The *interne* begged in vain, and departed indignant. George did not take the money his master sent him, saying, in an almost inaudible voice, "The pardon of my lord alone can save my life!" "How is George?" asked Lord G— one morning of his valet, who returned from the hospital sadder than usual. "George is no more," he replied, "he died during the night." "I am indeed very sorry; he was a brave man, whom I used to like very much," coolly responded his lordship. The worthy French doctor, who adduces the foregoing as an example of "orgueil et vanité d'un Anglais blessé dans ses chevaux," adds, "And Lord G— thought to satisfy his conscience by sending some money to the widow of the man who had the misfortune to allow him to be overtaken by a *fiacre!*" (lxvi).

The ill effects of Joy, when excessive, so contrary to its beneficial influence in moderation, has often been a subject of philosophical remark. I have seen it stated, within a few years, that several convicts, Irishmen, undergoing imprisonment for life, fell down dead on being informed that they were liberated.

The following well-known instances may here be added:—

Valerius Maximus states that two Roman matrons died with Joy on seeing their sons return in safety from the battle fought near Lake Thrasymenus. "One died while embracing her son; the other was suddenly surprised by the sight of her son while she was deeply lamenting his supposed death."

I may add that quite recently similar fates, the result of a rebound from Grief to Joy, have awaited several women in connection with shipwrecks, their husbands having been reported as certainly lost and then turning up.

That this influence would resolve itself into one of sorrow in some instances may be suggested by the cynic, but we decline for the honour of human nature to accept this explanation.

History also records that "Sophocles, at an advanced age, and in the full possession of his intellectual power, composed a tragedy which was crowned with such success that he died through Joy; that Chilon, of Lacedemon, died from Joy while embracing his son, who had borne away the prize at the Olympic games. Juventius Thalma, to whom a triumph was decreed for subjugating Corsica, fell down dead at the foot of the altar at which he was offering up his thanksgiving. Fouquet, upon receiving the intelligence of Louis XIV having restored him to liberty, fell down dead" (lxxvi, p. 96). To these examples may be added those of Diagoras, an athlete of Rhodes, who died from seeing his three sons return crowned from the Olympic games; and Dionysius, the second tyrant of that name, who died on hearing the award of a poetical prize to his own tragedy (xliii, p. 18).

Summary.—1. The emotions powerfully excite, modify, or altogether suspend the organic functions.

2. This influence is, in all probability, transmitted not only through vaso-motor nerves, by virtue of their mere action upon the calibre of the vessels, but by the direct action of certain of these nerves (the dilators), or of others, upon Nutrition and Secretion. As, when the excitement is of peripheral origin, a sensory or afferent nerve excites their function by reflex action, so when Emotion arises, it may excite the central nuclei of such afferent nerve, and this stimulus be reflected upon the efferent nerve; or it may act directly through the latter.

3. In regard to the processes of Nutrition, the pleasurable

emotions tend to excite them. Hence the excitement of certain feelings may, if definitely directed, restore healthy action to an affected part, and remove abnormal growths.

4. Violent emotions may modify Nutrition. Various forms of disease originating in perverted, defective, or inflammatory nutrition are caused primarily by emotional disturbance.

5. As respects Secretion, the emotions, by causing a larger amount of blood to be transmitted to a gland, increase sensibility and warmth, and so stimulate its function; or they may directly excite the process by their influence on nerves supplying the glands.

6. Painful emotions may modify the quality of the secretions, either by altering the chemical composition of the blood, or by directly influencing the functions of the gland.

7. The emotions may check Secretion, either by extreme acceleration of blood through a gland, by unduly lessening its afflux, or by direct influence upon the gland. Although, as a rule, the activity of those glands which bear special relation to an emotion, is in a direct ratio to its force, the secretion is checked when the emotion is excessive.

8. The pleasurable emotions tend to act only in one direction, that of increased activity of the secretions, but the painful emotions act both in stimulating and arresting Secretion. Thus, Grief excites the lachrymal, and Rage the salivary glands. On the other hand, the salivary secretion may be checked by Fear, and the gastric by Anxiety.

9. Lastly, although it may be doubted whether we are yet able to construct a consistent theory of the action of the emotions upon Secretion, we may endeavour to apply what we do know to occur on the external surface of the body to the internal organs, supplemented by the conclusions arrived at by Bernard. Fear, then, causes pallor of the cheek (apart from its action on the heart). Either the (sympathetic) contractors of the minute vessels have been stimulated, or the active (cerebro-spinal?) dilators have been paralysed—probably the latter. Assuming that the capillaries of the glands are similarly affected by Fear, we should infer that there would, with this emotion, be less vascularity and secretion. Consistently with this, we find the secretion of milk lessened by Fear or Fright. The temperature

of the skin is lowered, and its secretion checked, although cold sweats, as already explained, may occur. Salivary secretion is arrested. Intestinal secretion is often increased, it is true, but probably this may be explained, so as not to form a real exception to the general rule, that Fear has the effect on secretion which we should have expected from facial pallor. In the opposite condition of the cheek, from shame or guilt, it is difficult to say whether the activity of the glands tends to increase or decrease, but probably the former, and, if so, the parallel holds good. If, further, we regard the influence of Joy when, taking the place of Fear, it restores vascularity to the cheek, we see that the general action of joyful emotions is to augment the activity of the glands. The special action of Grief in exciting the lachrymal secretion cannot fairly be regarded as an exception; and Joy, even in this instance, may exercise its normal influence. In this condition of the cheek and glands we assume that either the vaso-motor contractors have been paralysed, or the active dilators have been stimulated—probably the latter. We have here confined ourselves to the action of the vessels, but by no means exclude the action of nerves which may act directly upon the glands. With regard to these, we cannot, however, ascend from the known and visible to the unknown and invisible. As to the relative share taken by the sympathetic and cerebro-spinal systems, we must be in doubt until physiologists decide the character of the dilator nerves; but if Bernard be right, in referring the contractors of vessels to the former system and the dilators to the latter, the opposite emotions of Fear and Joy would both act primarily through the cerebro-spinal system, and secondarily through the sympathetic, Fear paralysing the dilators, and allowing the sympathetic full sway, and Joy stimulating the dilators, and controlling the influence of the sympathetic.

CHAPTER XII.

DO MENTAL STATES, ESPECIALLY THE EMOTIONS, ACT INDIFFERENTLY UPON THE SEVERAL ORGANS AND TISSUES OF THE BODY?

To a considerable extent we have already answered this question in the negative, but we wish to refer more definitely, although briefly, to this important aspect of the inquiry.

While popular sentiment, ancient and modern, recognises tolerably definite relations between the several emotions and the bodily organs, there has been a marked diversity of sentiment among physiologists, except in reference to such glands—the lachrymal, the mammary, and the spermatic—as are obviously related to special Emotional States.

Lactantius, referring to the very widespread notion among the ancients that Anger or Desire is placed in the gall, Fear* in the heart, and Joy in the spleen, despondingly observes that "the acuteness of human sense is unable to perceive these things, because their offices lie concealed; but we cannot, however, prove that they who discuss these things speak falsely." "I know," says Müller, "no single proof, but only tradition, that in the healthy man, a passion acts more upon one organ than upon another. No special passion acts regularly upon the stomach or the heart; in a sound person their effects extend *radiatim* from the brain over the spinal cord, and over the animal and organic nervous system." And Dr. A. Zeller observes, "In the affections it is shown that the entire body is a psychical organism, and only a false tradition makes the special passions act exclusively upon special organs. Only in the

* Some thought wisdom, others courage. "Homines splene rident, felle irascuntur, jecore amant, pulmone loquunt, corde sapiunt." It is singular that in modern times the above notion concerning the spleen should have been reversed.

affections, which require a distinct member for the realisation of an urgent idea or craving, does a special current towards that organ occur."

In direct opposition to these opinions, we find Domrich stating that "the assertion that the several movements of feeling do not affect the special organs of the body in a different manner, both quantitive and qualitative, is one-sided and in contradiction to the experience of life; it is not true that Sorrow and Joy stir the heart in the same manner; it is an error to say that every passion may rise into weeping; it is false to say that only in the case of those who already have diseased liver, or an innate and excessive tendency to disease of the liver, does Anger disturb that organ. Who by unprejudiced examination would ever come to the conclusion that the bodily phenomena of amazement and of cheerfulness, of persistent heart-breaking sorrow, and of unrestrained joyousness, are the same? The more the affections are considered without prejudice, and the more closely they are psychically analysed, the more firm is the conviction that as well the kind of excitement as the most special nervous lines in which that stimulus proceeds are peculiar to single emotions." In the same direction Damerow expresses himself:—"An entirely distinct consideration is required in connection with the bodily effects of the emotions and passions, for the altogether individual, special, constant, or varying influence upon this or that organ."*

Let us now, passing from these conflicting sentiments, state succinctly what we really know in regard to the particular direction of the Emotions:—

1. It is admitted, in the first place, that, as respects some glands, one Emotion will specially influence them; that, for example, there exists a specific relation between Grief and the lachrymal glands, as also between maternal tenderness and the mammary glands. Rage appears to act more directly upon the salivary secretion than upon any other.

2. Again, it is equally certain that the Emotions do not act *exclusively* upon any one organ. This is true even of those

* For the foregoing opinions of Müller, Zeller, Domrich, and Damerow, I am indebted to Delitzsch.

which are admitted to be directly related to special glands; and of the rest, not only do they not act exclusively on a single organ, but the organ most affected is mainly determined by conditions which are independent of the distinctive character of the Emotion.

3. As any Emotion may act upon any organ, the same Emotion may induce different diseases, and *vice versâ;* but this is not in the least inconsistent with the position that, under the same circumstances, the same Emotion will produce the same disease. Of these conditions, one is the temperament or diathesis of the subject of emotional excitement, another is the presence of actual disease in an organ.

4. Different persons may be differently affected by the same Emotion—a corollary from the preceding remark respecting temperament.

5. As regards the action of the muscles in Expression, it has been shown that certain emotions affect the same muscles in all. Laura Bridgman did not require to be taught how to mould her features in Joy, Anger, &c.

6. Bain makes the forcible observation, that acute Emotions, as Wonder, stimulate the movements; massive Emotions, as the Tender Feeling, are more connected with the action of glands (lxxix, p. 8), a remark which may be applied to disorders of the motor and secretory systems.

7. Certain Emotions, as Fear, affect the action of the heart in all, both in health and disease.

8. Shame specially affects the skin, more particularly the cheeks. It is a common remark that while the blush of Shame commences at the cheeks and ears, that of Anger first flushes the eyes, that of Love the forehead.

9. It is generally held that the abdominal viscera are affected most by the painful or depressing Emotions, and the thoracic viscera by those of a pleasurable or stimulating character. There is a measure of truth in this, but it is certainly far from being a universal rule. Grief affects the heart very injuriously; and what is the sigh of Melancholy but a sign of the influence of Sorrow upon the respiration? So of the breathlessness of painful suspense. Joy, on the other hand, produces an effect upon the liver and stomach. Still, this opinion derives much support

from the fact that the most striking effects of Joy on the body are undoubtedly those referable to the heart and lungs, while Sorrow has a very certain influence in disordering the digestion. It is justly expected that a man should be "off his meat" from receiving mournful intelligence, while no one supposes that it will cause bronchitis. It may, indeed, induce an attack of asthma, but for once that it is followed by this affection it will induce loss of appetite hundreds of times.

10. In reference to ancient and popular notions about the connection between Anger and the liver—"felle irascuntur"—it may be observed that while they were chiefly, if not wholly, founded on the supposed influence of bodily disorder upon the state of the mind, the existence of such a relation, if established, would imply the converse action, the influence of the mind upon the bodily organs, and would assist us in endeavouring to trace such special relationships. Thus, the opinion that a disordered liver, more than a diseased lung, renders its possessor irascible, might fairly lead us to suppose that Anger more immediately acts upon the liver than the lungs.

11. On the same principle as affections of the heart frequently induce anxiety of mind, we think that Anxiety would be more likely, *cæteris paribus*, to cause cardiac than hepatic disease.

12. Again, in regard to the lungs, phthisis is proverbially associated with a sanguine condition of mind, and conversely it may be said Hope and Joy exert a marked influence over the respiration. However, these emotions, as we have seen, affect other organs in a striking manner also; so that it is only within a very limited range that we can successfully carry out the parallel, or, rather, reverse the physico-psychical phenomena. The intimate connection between the viscera themselves also interferes with the isolated action of emotional excitement.

Some light, perhaps, is thrown upon this inquiry by commencing with the primitive tissues of embryonic life—the mucous, the vascular, and the serous—the first representing the skin, alimentary canal, and glands; the second, the heart, vessels, and muscles; and the nervous system being developed from the third. For, if with an ingenious writer, Mr. Glen (lxxx), we take the essential structural forms represented by them, namely,

the cell, the fibre, and the tube, and endeavour to compare the action of the threefold states of mind, the Intellect, Emotion, and Volition, with each, we find a certain general relation between them, although this correspondence or correlation cannot be pressed beyond a limited extent. Thus, the Intellect may be said to act specially upon the tube—the nervous tissue; the Emotions upon the cell—the mucous tissue—as shown in the various glands enumerated in the last chapter; and the Will upon the muscular fibres—the muscular tissue. But, on the other hand, it must not be forgotten that it is, in fact, through the first, the nervous tissue, that all states of the mind, whether we term them intellectual, emotional, or volitional, act in the first instance. And further, that while the Emotions operate with remarkable force upon the skin, the alimentary canal, and the glands, they as powerfully affect the heart, which falls under the vascular or fibrous division of primitive tissues, and do not equally influence the voluntary muscles, included in the same category. Lastly, the nervous tissue is as much cellular as tubular, and the mucous tissue is not alone cellular. Still, this much is true, that, broadly speaking, the Intellect, primarily dependent upon Sensation for its perceptive and intelligential functions, is in the closest relation with the nervous system; that Emotion, so strikingly operative upon the Organic Functions, does exercise a special influence upon the glands and tissues, developed from the mucous membrane; and that Volition, having Motion for its main functional result, acts principally upon the muscular fibre. Intellect—nerve—Sensation; Emotion—the skin, glands, and alimentary canal—Organic Functions; Volition—muscular contraction—Motion; these, it will be seen, in glancing through this work, do bear a broad special relation one to another, one which, if not unduly pressed, may with advantage be present to the reader's mind while employed in the study of psycho-somatic phenomena. It may, however, be stated with more truthfulness that, while the Intellect confines its operations mainly to the brain, although capable of exciting motion and the organic functions, the Emotions act with by far the greatest force upon the heart and lungs, the vessels and the glands; and the Will, powerless in

regard to these tissues and organs, exerts its influence over the muscles engaged in the motions of the body.

Probably we cannot go much beyond these general principles, which, combined with the law that any emotion that, either by its character or its suddenness, depresses the activity of the controlling power of the cerebrum, allows of the irregular or excessive action of the encephalic, spinal, or sympathetic nerve-centres, will generally serve to explain the changes induced in the body by varying mental states.

PART III.

THE WILL.

CHAPTER XIII.

GENERAL PSYCHOLOGICAL AND PHYSIOLOGICAL PRINCIPLES.

In the chapters on the Influence of the Intellect and the Emotions, we were led by the interest of the subject beyond the design of this publication (that of illustrating by Cases, systematically arranged, the action of Mind upon Body), and entered at some length into their psychology and physiology. In regard to Volition, however, we shall speak more briefly, inasmuch as we have, under other terms, treated of what by many is regarded as belonging to the province of the Will.

Some confusion in regard to the term itself has, no doubt, arisen from not distinguishing between the wish or desire to do a certain thing (in accordance with the etymon *voluntas*), and the power to perform it. A man wills to walk, but his will is powerless to move his legs; yet the Will in the sense employed in the first clause, is in full force. It is the motor centre which is in a morbid condition or paralysed. On the other hand, when a physician says that, in a case of hysterical paralysis, the Will is paralysed, he means that the very wish or desire to move a limb is wanting. Indeed, Reid says that, "as it is unusual in the operations of the mind to give the same name to the power, and to the act of that power, the term Will is often put to signify the act of determining, which more properly is called Volition. Volition, therefore, signifies the act of willing and determining, and Will is put indifferently to signify either the

power of willing or the act." Then, again, there is more than the mere employment of "the Will" in two different senses; there is a real divergence of opinion as to whether it constitutes an independent and separate mental faculty, or is the balance of all the other faculties—that which finally results from the struggle continually going forward in the mind between the contending functions of Thought and Emotion.

Gall held that the Will resulted, not from desire alone, but from the combined operation of desire and intellect. "That man," he says, "might not be confined to desiring merely, but might will also, the concurrent action of many of the higher intellectual faculties is required; motives must be weighed, compared, and judged. The decision resulting from this operation is called the Will" (xxii, VI, p. 267).

James Mill observes, "The idea of an action of our own, as cause, strongly associated with the idea of a pleasure as its effect . . . . excites to action. It is called Will" (xix, II, p. 328). He then points out that, with the Will as a Cause and the action as an Effect, men have not been content, but have added an item called Force or Power, which comes between the two, as itself the proximate cause of the action. The action of a muscle, according to Mill, takes place in consequence of an appropriate idea, our power of willing not being immediate over a muscle, but consisting in the power of calling the idea into existence. The only circumstance distinguishing voluntary from involuntary actions is Desire. This analysis is accepted by Mr. J. S. Mill, so far as it applies to voluntary acts produced by motives of pleasure and pain, but as insufficient to explain those bodily movements, the consequence of which is pain and not pleasure, and he refers to Bain as probably the first psychologist who has succeeded in effecting a complete and correct analysis of the Will. Bain separates from the movements brought forward by James Mill, those which are of reflex and consensual character, and those which arise from Imitation, Expectation, and Imagination. It is among the movements excited by the last class, that we sometimes observe the remarkable tendency to act even in the direction of pain, to which reference has just been made. Thus, the sight of a precipice may, from the operation of the idea aroused, lead to the

painful result of precipitation. The law at work here has been referred to when considering the tendency of ideas to result in corresponding acts, as exhibited in Sympathy and Imitation (p. 26). The automatic action of the hemispheres is the physiological aspect of the law. Having withdrawn these three classes of cases of miscalled voluntary power, Mr. Bain considers that J. Mill's position, that there is a power in pleasure as such, and in pain as such, to stimulate muscular movements with reference to the pleasure or pain, is the nearest approach he has made to a clear statement of the law of Volition. "The element of the Will remaining unexplained is the *selection* of the proper movements in each case, as when we start up and walk in the direction of a pleasing sound" (xix, II, pp. 385, 389). For this he refers to two laws—the spontaneous beginning of movements, and the retentive or associative process. The former implies the tendency to act, not from sensation, but "by virtue of the fund of power residing in the active organs themselves." The latter implies that after a certain number of accidental associations between such actions and particular sensations, the above law of pleasure and pain retains or continues them when once begun. "The concurrence is fortuitous; the prolongation of it is not fortuitous, but follows the law of the Will—the abiding by whatever movement is giving pleasure."

Here the direct antecedent of an act of Volition is something more than the idea of the action to be performed; it may assume various forms, although all have the common object of gaining pleasure and escaping from pain.

In some able papers "On the Nature of Volition psychologically and physiologically considered," published in the 'Psychological Journal,' 1862-3, Lockhart Clarke combats Bain's views as too exclusive, and he points out that they are essentially included in Hartley's proposition that, "If any sensation A, idea B, or muscular motion C, be associated for a sufficient number of times with any other sensation D, idea E, or muscular motion F, it will at last excite D, the simple idea belonging to the sensation D, the very idea E, and the very muscular motion F," a law of association by which originally automatic acts become voluntary. "That this *accidental* association is

the means by which a great number of movements necessary for the alleviation of suffering and the procuring of enjoyment are originally discovered by the infant, there can be no doubt, but that this is the *only* means—that *all* such movements, in fact, and still more, that every kind of voluntary action must, as Mr. Bain contends, 'wait upon the *accidents* and improve them when they come,' so that *without these accidents* 'voluntary control could not find a starting-point'—appears to be entirely opposed to what may be observed and learned by every day's experience;" and he adds that there is an infinite number of movements which "have no immediate connection with physical pleasure or pain, but are expressly intended to be subservient to the endless variety of desires that are excited by the wants, tastes, or ideas constantly arising in the course of our daily avocations and transactions in life, and which frequently require, in accordance with the end in view, such a peculiar and complex combination or co-ordination of muscles as never could have occurred accidentally, and which nothing but repeated trials could possibly accomplish." Thus, as expressed by Clarke, the execution of by far the greater number of particular movements by volition "is not learned by a previous *accidental* association of those movements with particular *accidental* sensations," but "by the association of certain efforts or impulses with the requisite muscular co-ordination, discovered on trial, and rendered perfect by repetition;" in short, those instinctive impulses which in the infant excite muscular contraction *without* the intervention of any idea, are similar to the subsequent desire, wish, or inclination, aroused by external objects, which in combination *with* the idea of the action to be performed, constitutes the Will or Volition. Should this be the correct mode of regarding its nature, it is obvious that the Will is not a special faculty, independent of the other mental faculties, but that it is composed of an emotional or active element, and an intellectual or regulative element, the balance of which results in a volitional act. While, then, we speak of volitional states of mind, it must be remembered that ideas and emotions co-operate to constitute volition. We think, but our thoughts alone do not result in action, unless some feeling, or rather the desire to do a certain act, which is generated by the feeling, is

present. While, however, it is true that volitional acts necessarily arise from complex combinations of the various emotions and intellectual faculties, it is not the less true that our feelings and trains of thought may be controlled and directed—that is to say, one motive may modify or neutralise the force of another motive. It certainly is, however, a very difficult thing to understand how this control is exercised, easy as it may be, in accordance with the foregoing view, to explain how the decision is arrived at to exercise it, whether in regard to the mind or the body. Lockhart Clarke, after quoting Brown's observation, "Volition is not desire itself, but exertion in consequence," remarks, "Volition is the immediate result of a *desire to act*, which is *not checked* by some stronger or at least *more influential desire*, arising out of some feeling or emotion that *reacts through intelligence* for the attainment or avoidance of its object, and what is called the *exertion* of volition or the sense of effort, is the coincidence and approval of the intellect in the felt impulse, and the consequent combination and concentration of both in the desire itself or upon the desired end." The reader will find the arguments in favour of this view of the nature of Volition most clearly laid down in these papers by Dr. Clarke, and those in support of a distinct faculty in the works of Locke and Reid.

We may now briefly refer to a few of the various opinions which have been held by physiologists as to the encephalic seat of the Will. Gall, while endeavouring to find organs for all the mental faculties, maintained, consistently with his opinion, that the Will was the outcome of the combined operation of the intellect and the desires, that there could be no distinct organ for the Will. It is nowhere, and yet everywhere; in no special locality, in all localities of the brain, so far as its function is mind. And would not this be essentially the teaching of the physiology of the present day? This must not be confounded with the encephalic centre of motion, upon which the Will is impressed in muscular movements. Endless confusion has arisen here from confounding reflex with volitional acts. "The Will," says Brown-Séquard, "or at least *the faculty under the influence of the Will*, by which the so-called voluntary movements are produced, is considered by

Gerdy, Müller, Longet, and others, as having its organ in the pons Varolii and in the brain. The reasons given by these writers to prove their views are far from being satisfactory" (lviii, p. 231). Flourens held that the cerebral lobes alone are the seat of intelligence and volition (in the sense of the motor centre), a conclusion Brown-Séquard opposes on the ground that the corpora striata constitute the centres of voluntary motion, as maintained by Todd, Carpenter, and most physiologists of the present day. Many French physiologists, however, maintain that the pons Varolii is the centre of volition as well as sensation. Dr. Carpenter observes that "all those muscular movements which result from *voluntary* determinations, have their origin in the vesicular substance of the hemispheres, though the motor impulse is immediately furnished by the automatic apparatus, upon which the cerebrum plays," *i. e.* the corpora striata, although the motor tract itself does not appear to have a higher origin than these ganglia, "and it is impossible to imagine that the fibres which converge towards the surface of these bodies from all parts of the cerebrum, can be so closely compacted together as to be included in the motor columns of the spinal axis. The fact would rather seem to be, that these converging fibres (Reil's 'nerves of the *internal* senses') bear the same kind of anatomical relation to the corpora striata and the other sensorial centres of motor power, as do the fibres of the afferent nerves which proceed to them from the retina, &c." (viii, pp. 747, 776). Hence, instead of acting immediately upon the motor nerves, the force or impulse from the cerebrum is first directed to the motor ganglia, exciting there the same kind of response as is given to an impression transmitted from without through a sensory nerve. Schroeder van der Kolk also says, "The orders of the Will do not pass directly into the motor nerves, but into ganglionic cells, whence the peripheric action arises from the movements of the muscles" (lvii, p. 137). When we put the levator palpebræ into action, it is by willing to raise the eyelid. Dr. Carpenter observes that it is easy to show in the case of vocal sounds that we have no direct power over the muscles of the larynx, but that it is in fact the same with all so-called voluntary movements. The Will determines, but the automatic apparatus executes. Whether fibres pass

between the brain and cord through, or terminate, in the corpora striata, the volitional impulse is transmitted thence through the anterior tracts of the crura cerebri, the anterior pyramidal columns, and anterior portion of the olivary columns of the medulla oblongata, and the anterior columns and anterior portion of the lateral columns of the spinal cord.

CHAPTER XIV.

INFLUENCE OF THE WILL UPON SENSATION, THE VOLUNTARY AND INVOLUNTARY MUSCLES, AND THE ORGANIC FUNCTIONS.

SECTION I.—Influence of the Will upon Sensation.

The reader will find in the chapter on the Influence of the Intellect on Sensation, various illustrations of the power of Attention strongly directed by the Will to a particular region of the body. It is not, however, so much that the individual wills that certain sensations shall arise, as that he voluntarily directs his thoughts to certain parts of the system. The term Will is here employed in a somewhat confused way to describe two different ideas. It is true, as has already been said, that when we say we act upon the muscles by Volition, the expression is not, strictly speaking, correct, and that the Will only excites the actuating ganglia from which the motor nerves proceed; but when we act on a muscle by simple Attention, that is, only willing the direction of the attention, not the muscular contraction, we are conscious of a very different mental act. In fact, the difference in the nature of the act is clearly shown in the different result, for the motor ganglia with which the voluntary muscles are in relation are scarcely at all affected, while the centres of sensation and the nerves supplying the involuntary muscles are notably excited. While, therefore, in an act of Attention followed by corporeal effects, the Will in one sense may be said to operate upon the body, it is much less truly so than when the Will directly acts upon the body, however true it is that even in that case the action is not direct.

Whether the above distinction in regard to the Attention be correct or not, we may call the following case an illustration of

the influence of the Will, as direct as can well be imagined. Hyacinthe Zanglois, a distinguished artist of Rouen, who was on intimate terms with Talma, told M. Brierre de Boismont that "this great actor had informed him that when he entered on the stage he was able, by the power of the Will, to banish from his sight the dress of his numerous and brilliant audience, and to substitute in the place of these living persons so many skeletons. When his imagination had thus filled the theatre with these singular spectators, the emotions which he experienced gave such an impulse to his acting as to produce the most startling effects" (lxxxii, p. 41). On this case M. Brierre remarks, "The hallucination is thus, in some cases, under the control of the Will, and would seem to be excited instantaneously."

At p. 40 of this work, we referred to Newton's experience in regard to seeing the spectrum of the sun, under certain circumstances, when he meditated upon it, *without* any effort of the Will. Here it may be added that Dr. Wigan mentions a family, each member of which "had the power of forming a voluntary image of any object *at will*, on shutting the eyes, and that each could draw from memory a representation of it, more or less accurate."

Dr. Grey, in a note to his 'Hooper's Physician's Vademecum,' states that, "when a feeble and sickly child, I possessed the power of creating ocular spectra at will, in a very remarkable degree. I could design on the dark ground, and on a small scale, any picture, however complicated, filling in object after object with all the outlines and colours true to nature. During this period my imagination was uncommonly active in sleep, occasioning dreams of the most fearful kind. As my health improved, I lost this power of creating images at will, and since my seventh year have never regained it, though I have suffered occasionally from false impressions on the sense of hearing." With Goethe also, ocular spectra were voluntary; with Müller, involuntary.

The Will may, in some cases, influence hallucinations in the indirect way referred to in a case reported by Griesinger:

"An intelligent patient (a medical student), who had throughout, hallucinations of the left side during a violent

attack of insanity, had the impression that the voices did not come from the immediate neighbourhood; he had estimated them at a distance of several minutes. He also made the remarkable declaration that he could, by his belly, exercise voluntarily an influence on the hallucinations of hearing. On closer investigation it was seen that he meant the respiratory function of the abdominal muscles, and that it was by means of the respiration that he exercised the influence. On holding the breath, the voices were often changed—appeared to come from a point nearer or more distant. We know that in expiration, the cerebro-spinal fluid rises from the spinal canal into the cavities of the brain and subarachnoid space (owing to the filling of the numerous venous plexuses of the canal of the spinal marrow), and that it again subsides during inspiration" (lxxxi, p. 90).

SECTION II.—Influence of the Will upon the Voluntary Muscles.

The influence of the Will on the muscles has not, for us, the same interest as that of the involuntary action of ideas and of the emotions, inasmuch as it mainly refers to those ordinary movements which, from their essential and patent character, constitute in the popular mind the typical examples of the influence of Mind upon Body, and which require no illustration, and but little commentary beyond what has already been made in the previous chapter.

The acknowledged conditions upon which the successful exercise of the Will upon the voluntary muscles depends are—that there should be a clear conception of the thing willed in the hemispheres; integrity of the descending fibres, motor centre, and centripetal nerves; and, generally, a full belief in the power to exercise the Will.

The power of the Will over the voluntary muscles, as shown in the successful attempts to simulate nervo-muscular disorders, should not, however, be overlooked in this section.

There are two admirable instances to which we will briefly refer; the one, that of Dr. Calmeil himself, the other, that of a malingerer who has recently made himself notorious in the

London Hospitals. Esquirol maintained that no one could successfully feign an attack of epilepsy, not even those who were thoroughly familiar with all the symptoms. "One day," says Trousseau, "Dr. Calmeil and I were talking with Esquirol on this very subject, at the Asylum of Charenton, when suddenly Dr. Calmeil fell down on the floor in violent convulsions. After examining him for a moment, Esquirol turned round to me, exclaiming 'Poor fellow! he is epileptic!' But he had no sooner said so, than Dr. Calmeil got up and asked him, whether he still insisted on thinking epilepsy could be feigned" (liv, I, p. 42). The doctor's reply is not given. This illustration shows, not only the power of the Will in throwing the muscles into seemingly convulsive action, but the shallowness of the objection sometimes made against hypnotic phenomena, that they *may* be feigned, and, therefore, they probably are so, or at least that it is so difficult to distinguish between the false and the genuine that it is not safe to accept them as facts. Mr. Braid used to say that if any one was silly enough to play a trick upon him, it was quite possible he might be deceived. The inference that Braidism is an imposture, is just as reasonable as to infer that all epileptic seizures are feigned, because Calmeil succeeded in deceiving so practised an observer as Esquirol.

The other case referred to, will be found reported in the 'Lancet' for February 17th and April 13th, 1872. The patient, who usually professed to have been a medical man, contrived to deceive "many physicians and surgeons of great eminence," so well did he force his muscles to assume the condition of paralysis, convulsion, or rigidity, which he desired to simulate. "Who," says the above journal, "would have believed in the possibility of simulating tetanus for a week, or ten days, or more?" and adds that "the case has always excited the greatest interest both in professors and students, and the notes have always been taken with that care and voluminousness which the rarity of the case demanded. . . . His symptoms were usually those of hemiplegia, with great rigidity of the paralysed muscles, and tetanic spasms of the opposite side. On one occasion he presented the appearances of true traumatic tetanus, and the surgeon under whose care he was at this time, said he

could hardly discover a flaw anywhere in his imitation. During one of his series of simulations, a very large and painful carbuncle formed on the back of his neck, and his life was really endangered, his pulse being 150. He was evidently alarmed at his condition, and his strength was much reduced; *and yet he never forgot his opisthotonos*, but pertinaciously ground his carbuncle against his pillow." As showing the influence of Mind over Body in another way, one physician observes, "I think the case an interesting one, for he is clearly not an ordinary rascal. He must have much of that mental condition seen in hysterical women." It having been observed at one hospital that, notwithstanding the tetanic spasm of his limbs, the muscles of the abdomen were lax, these became subsequently "as hard as boards." In one hospital he presented all the appearances of left hemiplegia. A few days after admission he became affected with convulsive spasms of the paralysed side. "The gradual onset of his symptoms from slight, at first, to the most grave in the end, was admirably assumed, and was so like the book description of 'ingravescent apoplexy,' that the idea of imposture seemed really absurd." During the same year, having fallen down in "a fit" near St. Paul's Churchyard, he was taken to a hospital, where, soon after his admission, paraplegia appeared. Some months afterwards, he fell down again in London, and at another hospital was treated for hemiplegia during two months. Three months later he was admitted at a provincial hospital with well-marked symptoms of hemiplegia, the paralysed limbs being rigid. In less than a week he stated he felt much better, and wished to be discharged. On the same day he was seen walking about the streets perfectly well. He was subsequently a patient in at least four more hospitals, and was very successful in his simulations. In one instance "he had an attack of tetanus, complete in every particular. Every spasm was noted, and it is certain that the amount of sleep which he got during the time was incredibly small. A student sat up with him almost every night, and the slightest changes were taken note of and recorded. We are told that it was really beautiful to watch the effects of remedies in relieving the poor patient's agonies. On the 19th he left the hospital in a fit of indignation, because he heard a nurse say she thought

he was shamming. During his fourteen days' sojourn, he consumed 234 ounces of whiskey or brandy, and on the first four days he had eighteen hypodermic injections of morphia, containing one third of a grain each."

Voluntary power over the muscles may be lost, and yet Emotion may be able to excite their action; and, *vice versâ*, emotional influence may be suspended and voluntary power remain.

Thus, a gentleman, A. B., in middle life, is the subject of paralysis of the nerves supplying the tongue and palate. The affection came on rather suddenly, but, for many years before, he had suffered from the effects of a serious accident to the head, in consequence of which the brain was permanently injured. There was not, however, any sign of paralysis. The paralytic attack above mentioned was marked by inability to articulate, or to chew his food, while the muscles supplied by the *portio dura* and the third pair, were unaffected. He had no difficulty in expressing himself by signs or in writing. This state has continued for several years without material alteration. Now, in this case, emotional excitement frequently has the effect of enabling him to articulate a sentence or two, although muffled in character.

Romberg gives two interesting cases illustrative of the class of facts now referred to.

The first was that of "a widow, æt. 50, who had already passed through two apoplectic attacks, causing loss of speech and paralysis of the left side, the former occurring after violent vexation. The face of the patient was perfectly smooth, without either furrow or expression. All the muscles of the face were deprived of voluntary movement. She was neither able to contract her forehead nor her eyebrows, to raise the nostrils, nor to move her cheek and chin. She was incapable of closing the eyelids; when required to do it, she used her finger or looked on the ground, by which the eyeball was directed downwards; the levator tarsi relaxed in its contraction, and the upper eyelid also moved downwards. On the other hand, she was not able to raise or close her lips, so that the mouth was constantly opened slightly, and the saliva ran out, rendering it necessary for the patient to be constantly wiping her lip. The lower jaw

was movable, the patient was able to open her mouth and chew; but even these movements were not quite of a healthy character, for she was unable to open the mouth wide, and she was equally incapable of performing rapid movements of the lower jaw upon the upper jaw. The tongue did not obey the Will in the least; she was neither able to protrude it between the teeth, nor to move it backwards or to the sides; it lay in the mouth like a wedge, and rendered voluntary deglutition and mastication almost impossible. The sense of taste, as well as tactile sensation, were unimpaired, both in the tongue and throughout the surface of the face. Speech was impeded, but there was not complete aphonia, for the patient was able to utter an inarticulate sound, but it was out of her power to modulate its pitch. The sound was not a distinct vowel, but something like *ang* or *ong*, for even when the mouth was wide open she was unable to say *a* distinctly, much less to articulate any other vowel."

On the other hand, while the Will could not influence the contraction of these muscles, their action was excited by direct or reflected stimulation, if we may call emotional excitement direct, and that which arose from without, reflected. A ludicrous idea—an internal excitor—at once excited the muscles employed in laughter. "The patient smiled and laughed, passing through all the shades of the movement without any difficulty, and at the same time the lips, cheeks, and nostrils went through the same movements which a healthy person can perform, but over which our patient had no control. They were as little induced by any external stimulus, as pricking or pinching the cheek. When she laughed, she was also able to produce other sounds besides those mentioned. These sounds were also inarticulate, but still they varied in their elevation according to the character of the emotion that caused the laugh, a circumstance not otherwise observed. But it became evident how little these sounds were under the voluntary control of the patient when she laughed violently; she then uttered a peculiar, grunting, animal sound, of which she was in a measure ashamed, and would willingly have suppressed. She therefore, tried to shorten it as much as possible; however, the sound continued even after the movements of laughter had

ceased, at a time when in a healthy individual no further sound would have been emitted" (abridged from xxxiv, II, p. 278).

This patient subsequently died of cholera, and a post-mortem examination disclosed a hæmorrhagic cyst, the size of a small walnut, at the external edge of the right hemisphere, at the junction of the anterior and middle lobes.

In the following case, the Will *retained* its influence over the muscles supplied by the facial nerve, when the emotions were powerless:—

The right side of the face of a girl, æt. 12, was "expressionless in emotions, and showed no increased action in accelerated respiration, after running, &c. Nevertheless, the child was as able to control the muscles on this side as those on the left; she could move the angle of the mouth, dilate her nostrils, wrinkle her forehead, and contract her eyebrows at will. There was no marked change in the sensation of the right side. The movements of mastication were undisturbed at either side when the child was regarded full in the face, while in a state of repose the mouth was found to slant, as in the usual instances of sudden peripheral paralysis of the facial nerve; but as soon as the features (of the sound side) were altered by emotions or by talking, the unequal action of the two sides of the face became manifest.

"The child was delicate, and the malady was developed gradually. Besides, there was a deviation of the vertebral column, between the scapulæ, of about one third of an inch from the straight line to the left, and the right half of the thorax appeared sunk to the same extent" (xxxiv, II, p. 280).

The various forms or modifications of respiration—sighing, yawning, sobbing, laughing, coughing, and sneezing—can be performed, or at least imitated, by the Will; but, when not excited by local irritation, are usually induced by the mental stimuli comprised under our second division of mental states—Emotion.

Hunter, who, not only by his writings, but by the disorders of his own body, serves a useful purpose in the present investigation, had a remarkable attack, during which he was able to keep up respiration by the Will. We read in his biography that "he once suffered from an alarming spasm attended by a ces-

sation (?) of the heart's action, which lasted three quarters of an hour, in defiance of various active remedies suggested by Dr. Hunter, Sir George Baker, &c. . . . . The immediately exciting cause was a violent mental affection. During this attack, the sensation and voluntary actions continued unaffected, and Hunter continued to respire by a voluntary effort, with a view of keeping himself alive; though, as he afterwards observed, the continuance of respiration was probably of no service, as the circulation had ceased" (ii, I, p. 45).

In vocalisation, the action of the Will on the vocal muscles, is greatly influenced by the sense of hearing, persons born deaf being unable to direct their movements so as to produce intelligible sounds. In deglutition, the Will can only be said to act indirectly, namely, by supplying the required stimulus—the saliva or food. The muscles engaged in urination and defecation are, of course, largely influenced by the Will. It is unnecessary, however, to do more than refer here to such works as Carpenter's 'Human Physiology.'

The Will also possesses the power of controlling, within certain limits, the reflex action of the voluntary and semi-voluntary muscles, both in health and disease, whether excited by ideas, sensations, or local irritation without sensation.

Although ideo-motor acts presuppose the Will's abeyance, and the cerebrum's automatic action, it may be said that the Will is constantly engaged, except in sleep and allied conditions, in limiting, directing, and controlling the automatic or reflex action of the brain, and the muscular movements resulting therefrom.

An involuntary malediction half escapes the mouth, and is checked by the forcible repression of the Will. In the early stages of insanity, the conflict between the Will and automatic cerebro-muscular action is often, as we all know, intense.

The influence of the Will, in controlling consensual movements, is sufficiently well shown in the familiar instance of the resistance which can be offered to the contraction of the orbicularis, if forewarned; we resolve not to yield to the attempt to startle us into winking, or to the motions which naturally ensue from tickling the sole of the foot, &c.

Voluntary efforts to control or suspend true excito-motor

movements, as in respiration, defecation, &c., though for a time successful, are in the end, and in no long time, defeated by the irresistible force of the spinal nerves, or rather cord.

We may see this in animals as well as in man. For example, my cat is troubled with a bad cough, which comes on in paroxysms. The other day, when one of these attacks occurred, she heard a mouse behind the skirting board near her. Her attention was immediately arrested, and the cough ceased; the moment before in a state of distress, she was now lively and excited. After a while, however, a struggle occurred between the two forces, derived from the volitional and respiratory centres. She stood ready for a spring, and was most anxious to be perfectly quiet, but she could not prevent occasional coughs, which would effectually frighten away her intended victim. Reflex action was not entirely under the control of the Will, but was notably checked by it.

The following simple example, occurring in John Hunter's practice, serves to show the power of the Will in antagonising reflex action:—A woman, aged 46, was troubled for some years with spasmodic wry neck. This contraction of the sterno-mastoid it was always in her power to prevent by contracting the muscle of the opposite side, when she sufficiently recollected herself. The affected muscle did not contract itself, unless she accidentally contracted it a little, after which it continued till the full effect was produced.

A good illustration of the same power occurs when aroused from sleep by simple cramp of the gastrocnemius; we are able, by the vigorous exertion of the Will, to extend the muscle in spite of powerful reflex action to the contrary.

The suspension of the Will, from whatever cause, allows of the free play of the centres below the cerebrum, and thus explains the reflex or automatic acts which occur after mental shock.

In addition to its action through the nervous system upon the purely voluntary muscles in producing movements, the Will can exert a certain active influence over those of the semi-voluntary class engaged in respiration, deglutition, urination, and defecation.

SECTION III.—Influence of the Will upon the Involuntary Muscles and the Organic Functions.

The direct action of the Will upon the heart and non-striated muscles of organic life, if it can be ever exerted, is altogether exceptional, although it may powerfully influence them *indirectly*, by directing the course of the emotions and ideas to them, and in this way it may and does affect the organic functions.

The alleged occasional direct action of the Will over the heart and non-striated muscles is of physiological interest, although, if admitted, of too rare occurrence to be of much practical importance.

A distinguished Fellow of the Royal Society (æt. 79) told me that he could, by voluntary effort, increase the frequency of his pulse from 10 to 20 beats in the minute. He acceded to my request to make the experiment, with some reluctance, from a sense of danger accompanying it, or at least a conviction that it was not desirable for his health. On being seated, the pulse was, I found, 63, soft and regular. In the course of about two minutes, it increased in frequency to 82. On requesting him to describe how he attempted to accelerate it, he said that he could hardly describe the character of the effort, but that it seemed to be partly due to "a sort of impulse, accompanied by an internal shiver, and partly to an action upon the breathing." As, however, the mere direction of the Attention to the heart is sufficient, under certain circumstances, to increase the number of its beats, it does not seem necessary to suppose that the Will acted directly upon the muscular tissue of the heart, in the same sense as we speak of its acting upon the voluntary muscles. The writer is not, however, able himself to increase the frequency of the pulse by the concentration of the Attention. In regard to the respiration, his experience is the same, nor was there in this gentleman's case, any apparent increase in the respiratory movements.

The case of Colonel Townsend has been often adduced as an instance of the power of the Will in controlling the action of the heart; but interesting and remarkable as the phenomenon he exhibited was, the Will possibly acted only indirectly on this organ, the cardiac symptoms resulting from a peculiar condition of the nervous system, self-induced, and resembling that oc-

casionally caused by Artificial Somnambulism. Dr. Carpenter inclines to this view, "for in this condition," he observes, "there is sometimes an extraordinary retardation of the respiratory movements and of the pulsations of the heart, which, if carried further, would produce a state of complete collapse" (viii, p. 1103). Calmeil thinks that it need not occasion much surprise if the Will should, in some cases, be able to suspend the action of the heart; and certainly, if in, at least, one instance about to be mentioned, voluntary rumination has occurred, there is no reason why an exceptional distribution of the nerves should not have enabled Colonel Townsend to influence his heart even directly. The statement respecting him is that "he possessed the remarkable faculty of throwing himself into a trance at pleasure. The heart ceased, apparently, to throb at his bidding, respiration seemed at an end, his whole frame assumed the icy chill and rigidity of death, while his face became colourless and shrunk, and his eyes fixed, glazed, and ghastly; even his mind ceased to manifest itself, for during the trance it was as utterly devoid of consciousness as his body of animation. In this state he would remain for hours, when these singular phenomena wore away, and he returned to his usual condition" (lxxxv, p. 231). Dr. Cheyne and Dr. Baynard believed on one occasion that life was extinct, and were about to leave the colonel, when signs of returning animation appeared. (See Appendix.)

Dr. Darwin says, "There is an instance told in the 'Philosophical Transactions' of a man who could for a time stop the motion of his heart when he pleased, and he adds the case of a gentleman who could so far increase the peristaltic action of the bowels by voluntary effort, that he could cause their action at any time in half an hour" (lxxv, I, p. 39).

In this connection, the prolonged suspension of active vitality in the Fakirs, authenticated by English officers and medical men, and referred to by Mr. Braid and Dr. Carpenter, is important, as being probably induced by the Will forcibly concentrating the Attention upon one subject, and leading to a condition of the organic functions similar, in some respects, to that of Colonel Townsend. St. Augustine gives a case of voluntary trance in the 'De Civitate Dei' (Opera, Edit. 1569, vol. v, p. 796):—"Jam illud multo incredibilius, quod plerique

fratres memoriâ recentissimâ experti sunt. Presbyter fecit quidam nomine Restitutus in parœcia Calamensis ecclesiæ, qui quando ei placebat (rogabatur autem ut hoc faceret ab eis qui rem mirabilem coram scire cupiebant), ad imitatas quasi lamentantis cujus libet homines voces, ita se auferebat a sensibus, et jacebat simillimus mortuo; ut non solum vellicantes atque pungentes minime sentiret, sed aliquando etiam igne ureretur admoto, sine ullo doloris sensu nisi postmodum ex vulnere; non autem obnitendo, sed non sentiendo non movere corpus, eo probabatur, quod tanquam in defuncto nullus inveniebatur anhelitus: hominum tamen voces, si clarius loquerentur, tanquam de longinquo se audisse postea referebat." In hypnotism, the process suspends the influence which antagonises that of the sympathetic over the calibre of the cerebral arteries, but this is due to exhausting the cerebrum, by straining the muscles of the eye, and by the concentration of the Attention, which are both dependent on the Will. It does not act, however, directly upon the calibre of these vessels, nor is there sufficient proof that, in any instance, the individual Will has been able to act directly upon the arteries of the body, apparent examples of this power being attributable to rigidity of the surrounding muscles, or to emotional states, excited by the Will.

In considering the possibility of the Will acting upon non-striated muscles in some instances, we must not omit to mention that Peter Frank and Blumenbach record two cases of great interest. In that related by the former, the power existed of commencing the act of rumination by the direct exercise of the Will. In Blumenbach's case a patient affected with rumination was able to arrest it by volition (xxxiv, II, p. 14).

Voluntary rumination is incidentally mentioned by St. Augustine in the following passage, the whole of which is worthy of preservation:—"Sunt qui et aures moveant vel singulas, vel ambas simul. Sunt qui totam cæsariem capite immoto quantum capilli occupant, deponunt ad frontem, revocantque cum volunt. *Sunt qui eorum quæ voraverunt incredibiliter plurima et varia, paululum præcordiis contrectatis, tanquam de sacculo, quod placuerit, integerrimum proferunt.* Ipse sum expertus, sudare hominem solere cum vellet. Notum est, quosdam flere cum volunt, atque ubertim lachrymas fundere"

(loc. cit.). Voluntary perspiration, it will be observed, also finds a place in the above enumeration.

Of the muscles concerned in vomiting, the abdominal are, no doubt, more or less under the influence of the Will; but it differs from the semi-voluntary acts, such as defecation, with which it is frequently classed, in that it cannot be performed by all persons voluntarily, at one time or other, in consequence of some of the muscles required by the act being altogether of the non-striated class. Romberg states that Bichat possessed the power of voluntarily vomiting, and that Richerand cites an instance of it also. It would be interesting to know whether this power was exerted in these cases without any previous nausea whatever.

The examples, however, of alleged voluntary control over the heart, stomach, and œsophagus, are so rare that, at most, they only prove that exceptions may occur to an almost universal rule, and are of no practical utility.

The exceptional influence of the Will over non-striated muscle, is exhibited in the power possessed by some persons of contracting or dilating the pupil at pleasure. Professor Laycock states that a gentleman now living (1860) possesses this power. He does not say whether the action of the Will was direct, or through the medium of ideas. Possibly he refers to Dr. Paxton, mentioned below.

The case of Prof. Beer, of Bonn, is thus described in the 'British and Foreign Medico-Chirurgical Review,' on the authority of Budge:—"He is able in the same light to contract or dilate his pupil at will. This change in the size of the pupil, however, he brings about only through certain ideas; when, for example, he thinks of a very dark space, the pupil dilates. When, on the contrary, he thinks of a very light place, the pupil contracts. He finds it more difficult to induce contraction than dilatation."

It is added, "Budge has met with several other persons who can dilate the pupil in consequence of such ideas, but not another who can contract it also." The reviewer holds that from such cases we must conclude, not that the motion of the iris is voluntary, but that the idea of a sensation can bring forth motions as well as the actual sensation itself." From the

same source I take the following :—" Professor Allen Thompson, of Glasgow, has lately published, in the 'Glasgow Medical Journal,' some remarks on the case of Dr. Paxton, of Kilmarnock, who possesses an unusual power of contracting and dilating the pupil, alleged to be voluntary and independent of any effort at adjustment of the eye. Dr. Paxton showed Dr. Thompson the motions of his iris, "alternately contracting and dilating the pupil to a great extent, with apparent ease, at will;" and he informed Dr. Thompson "that although, in producing the motions of contraction and dilatation of the pupil, he did not actually make an effort of adjustment, or attempt to fix the eye alternately on a near and distant object, yet the effort to make either of these motions seemed to him, as it were, very similar to the motions for adjustment." [Mr. Braid states that "by directing the eyes loosely, upwards or downwards, to the right or to the left, as if looking at a very distinct object, the pupils become very much dilated, irrespective of the quantity of light passing to the retina, so that in this manner we can contract the pupil at will" (vi, p. 36).] Dr. Paxton further stated to Dr. Thompson, in proof of his possessing a power greater than usual of moving the iris independently of adjustment, that he "can fix the eyes upon a near object, and, while steadily looking at it, dilate the pupil without any effort for adjustment for distant vision, and while continuing to look at a distant object he can still further dilate the pupil and contract it at will, without any attempt at adjusting the eye for near vision." In short, as Dr. Paxton himself informs us in a letter, "he can alternately dilate and contract the pupil with as much facility as he can open and shut his hand," and that, without the slightest effort at adjustment. This he can do also more rapidly than the pupil can adjust itself for near and distant vision. The pupil, Dr. Paxton says, has the ordinary action under the influence of light and shade, but he can always at will dilate it, whether the eyes be exposed to light or shade.

"It is by dilating that he must always begin the movements in question. By a slight effort of what appears to him to be relaxation, he dilates the pupil, and when the pupil is dilated, he can, by a slight effort of bracing up, contract it. Further-

more, Dr. Paxton says *that it is not by raising up any idea in the mind, such as thinking of light and shade, that he calls forth the movements of his pupils, but by distinct efforts,* and that he is always conscious, both by the state of vision and by the sensation in the eye, whether the pupil is in its normal condition or not" (vii, October, 1857).

The desperate effort to awake from partial sleep which we are at times conscious of making, might seem to be, when successful, an instance of the influence of the Will over the vessels of the brain; but what happens? The Will acts in two ways—first, the very effort to arouse oneself from sleep, excites the inhibitory action of the brain upon the sympathetic ganglia, which, uncontrolled, cause the contraction of the cerebral vessels as referred to at p. 85 of this work; secondly, the voluntary muscles are gradually excited to action. But if the brain be in the peculiar condition present in trance, there may be consciousness and the strong desire to awake, without the power. In other cases, the fearful struggle may at last end in cerebro-spinal victory, and an escape from the grip of the sympathetic. Crichton gives such a case, that of a young lady who, in this state, was laid in a coffin. "On the day of her funeral several hymns were sung before the door. She was conscious of all that happened around her, and heard her friends lamenting her death. She felt them put on the dead-clothes, and lay her in the coffin, which produced an indescribable mental anxiety. She tried to cry, but her mind was without power, and could not act on the body. It was equally impossible to her to stretch out her arms, or to open her eyes, as to cry, although she continually endeavoured to do so. The internal anguish of her mind was, however, at its utmost height when the funeral hymns began to be sung, and when the lid of the coffin was about to be nailed on. The thought that she was to be buried alive was the first one which gave activity to her mind, and caused it to operate on her corporeal frame. Just as the people were about to nail on the lid, a kind of perspiration was observed to appear on the surface of the body. It grew greater every moment, and at last a kind of convulsive motion was observed in the hands and feet of the corpse. A few minutes after, during which fresh signs of returning life appeared, she at once

opened her eyes, and uttered a most pitiable shriek" (lxiii, II, p. 87). In this case, the first indication of the relaxation of the capillaries, gradually freed from the excessive contracting influence of the sympathetic ganglia, was perspiration.

In concluding the consideration of the Will, it may be said that the great fact to be borne in mind in regard to the range of its operation is that, while it cannot influence (unless in a few rare cases) the organic functions directly, it can indirectly, through its employment of other mental forces, and can exert immense influence over the irregular movements of the muscles and automatic cerebral action.

PART IV.

INFLUENCE OF THE MIND UPON THE BODY IN THE CURE OF DISEASE.

CHAPTER XV.

GENERAL PSYCHOLOGICAL AND PHYSIOLOGICAL PRINCIPLES.

Having considered the influence of varying mental states upon the bodily functions, both in exciting their physiological and pathological action, we proceed to illustrate the effects of the same influence upon morbid conditions of the system. John Hunter only stated the truth of the case partially when he said, "As the state of the mind is capable of producing a disease, another state of it may effect a cure," if by this he meant to imply that a different kind of emotion is required to remove a disease from that which caused it, whereas the character of the mental excitor may be, and often is, the same in both instances. Fear may heal as well as cause disease. It would therefore be more correct to say that as in health certain mental states may induce disease, so in disease certain mental states may restore health.

The Illustrations which we shall bring forward may seem to some a thrice-told tale and of little practical use, but they are, in the author's opinion, of great importance on several grounds, but especially so in regard to the question whether the psychical cures of disease performed by Mesmerism and kindred processes, are due to a force proceeding from A the healer to B the healed, or are simply the result of the particular mental state of B, excited by A. It is obvious that in those cases in

which the individual's own emotion (*e. g.* Fear) causes changes in the body, there can be no influence derived from the hypothetical disease-healing emanation of another person; and if the cures are as frequent and as complete under these conditions, there is no occasion to assume that any other principle is at work in those cases in which the cure is preceded by some particular action on the part of another. If, on the other hand, it is found that although certain emotions, as Fear, exert a marked effect in removing morbid conditions of the system, the presence or contact of some individuals possesses a still greater influence, or if while an ordinary mortal can act upon a patient's disease, beneficially, by designedly exciting his Imagination, his Will, or his Hope, a Valentine Greatrakes can, by the touch of his hand, exert entire and instant influence, which takes effect in a larger number of instances—an effect which is more powerful in its operation, which is asserted to be an accidentally discovered gift, and is practised without any regard to the supposed action of the Imagination—then a different principle may be suggested, but it is not proved by these circumstances, for the question still arises whether B's fear of, or faith in A, does not even then constitute the real explanation of the effects produced. A man possessing—

"An eye like Mars, to threaten and command,"

is certainly much more likely to influence the nervous system of B than if destitute of an expression indicating force of will. The strongest argument in favour of the possession of a distinct power on the part of Greatrakes would be drawn from the circumstance that the sense of an overwhelming mental force or impulse was, in the first instance, the cause of his applying his hand to parts affected with disease. It may fairly be asked, why was he successful before there was the least reason to expect any remarkable effects from his "stroking"? This early success, taken in connection with the impulse which he experienced, ought at least not to be overlooked by an honest investigator of the success of his method, as witnessed by Boyle and other acute observers, for it is certainly the most difficult circumstance to explain merely by the action of the patient's mind upon the disease. At the same

time, although it is difficult to conjecture why he had an impulse to heal by stroking, it is certain that no one could be stroked without having the attention more or less strongly directed to the seat of the disease, and that the mere process of stroking may be of great use in altering the capillary circulation of the part, in the same way as the metallic tractors prove beneficial. In neither method must the physical element be overlooked.

But even should it be eventually shown that a power emanates from some persons as is alleged, which when applied to disease exerts a salutary influence, the cases collected in this chapter will not be useless, for they will show what *can* be done without the contact of another person, and will serve as a warning not to conclude hastily that, in other cases, different powers have been exerted. Such emanating power is not intrinsically absurd. We recognise animal electricity; and the correlation of physical forces makes it difficult to see why animal magnetism should be regarded as impossible. Only, it would be altogether unphilosophical to have recourse to this or any odylic agency, if the phenomena in question can be explained without it. The advocates of a magnetic fluid themselves admit that the Imagination may, as regards certain phenomena, produce in some instances the same results. The most able and prominent supporter of Mesmerism in this country, the late Dr. Elliotson, says, "If a mesmeric effect has once been produced—an effect unquestionably of mesmeric agency—we cannot be sure when it recurs, even under mesmeric processes, that it is not the result of Imagination, if the patient is aware of mesmeric means being employed in order to induce it. Whether Imagination could induce a violent inflammation of the eyes, with a severe eruption on the skin, on a certain day fixed upon by the patient long before, I will not say; but that the idea of a fit of convulsions, pain, &c., occurring on a certain future day and hour, is sufficient to excite it at the very time foretold, I have no doubt, and many such apparent predictions are of this nature and no predictions at all, but results of a strong Imagination" (xxxvi, January, 1853, p. 358).

So also Dr. Gregory, the late Professor of Chemistry in the University of Edinburgh, in urging the proofs in favour of the occurrence of certain psychical phenomena independently of the

Imagination, candidly admits that "the impressible state" may be caused by an appeal to this faculty. "It may be," says he, "induced by an internal change in the patient's nervous system, caused by what may be called an appeal to the Imagination, or in other words, by the physical effects of fixed gazing on the nervous system of him who gazes." Again, "It is certain that in the greater number of cases the impressible state is produced by means of an appeal to the Imagination of the patient, and when he is in that state, the very character of the phenomena now to be described consists in their connection with and dependence on the Imagination—that is, on mental impressions made on the patient. For this reason we call them the phenomena of Suggestion, or suggestive phenomena" (xxxvi, April, 1852).

The foregoing is equally true when applied to the cure of disease. In regard to the explanation, which some are disposed to find in Dr. B. W. Richardson's "Theory of a Nervous Ether," of the relief of disease by mesmeric manipulations, it may be remarked that this ether may exist, but be incapable of passing from A to B, or it might thus pass and yet not be a curative agent. All Dr. Richardson suggests is that there exists, in addition to a nervous fluid, a gas or vapour, pervading the whole nervous organism, surrounding, as an enveloping atmosphere, each molecule of nervous structure, and forming the medium of the influences transmitted from a nerve-centre to the periphery, and from the periphery to a nerve-centre. This theory might be applied to explain the cure of disease by Mesmerism, so far as the means adopted may concentrate the nervous ether in one part, but this is quite a different thing from supposing that it escapes from the tips of the fingers, and exerts an influence over another person. So, in regard to the resemblance of nervous to electric force,* this affinity may be true, but such force may

* Sir Benjamin Brodie, adopting this hypothesis, observes that "the transmission of impressions from one part of the nervous system to another, or from the nervous system to the muscular and glandular structures, has a nearer resemblance to the effects produced by the imponderable agents than to any thing else. It seems very probable, indeed, that the nervous force is some modification of that force which produces the phenomena of electricity and magnetism, and you may recollect that I have already ventured to compare the generation of it, by the action of oxygenized blood on the gray substance of the brain and spinal

not pass from A to B. The admitted evolution of electricity in man does not appear to be present in unusual degree in those cases in which the power to heal disease by the hand is alleged to exist; and those persons who, like the lady and the monk, whose cases are cited by Carpenter in his 'Human Physiology,' have an excess of electricity, are not credited with any special healing gifts. Arago is stated* to have arrived at the following, among other conclusions, in a report to the Academy of Sciences, on a case more remarkable than the foregoing, but I have been unable to verify the reference: "That, under peculiar conditions, the human organization gives forth a physical power which, without visible instruments, lifts heavy bodies, attracts or repels them according to a law of polarity, overturns them, and produces the phenomena of sound." Contrary to the opinion of Mr. Braid he, according to the same report, believed that a peculiar sensibility to the magnet sometimes exists. It is to be hoped that the interest at present excited in so-called "Psychic Force" will lead to a more extended and patient examination, on the part of competent observers, of such phenomena. Whatever may be eventually proved, it will not be the less true, *first*, as regards our immediate inquiry, that if B's Expectation, Will, or Emotion, cure his disease as effectually without as with the presence of A, it is unphilosophical to assume any other curative agent to be present; and, *secondly*, that it does not follow that because the Emotions or the Imagination can cure disease, that therefore there can be no beneficial influence proceeding from A to B.

chord, to the production of the electric force by the action of the acid solution on the metallic plates, in the cells of a voltaic battery" (xxx, p. 159).

* Among other works, in an anonymous brochure, entitled "The Principles of Spiritualists exposed," 1864.

CHAPTER XVI.

INFLUENCE OF MENTAL STATES UPON DISORDERS OF SENSATION, MOTION, AND THE ORGANIC FUNCTIONS.

SECTION I.—Influence of Mental States upon Disorders of Sensation.

Odontalgia.—We all know how one common, but painful, affection—toothache—is removed temporarily or permanently by Fear or by the Imagination. Familiar with instances of this kind, we can readily believe the statement made by Dr. Ranieri Gerbi, Professor of Mathematics in Pisa, in a pamphlet entitled 'Storia Naturale di un Nuovo Insetto'—the insect here referred to being called by him *curculio anti-odontalgicus*. Its virtues were wonderful, for if squeezed between the fingers, they had only to be applied to the tooth to relieve its aching. Dr. Gerbi states that by this process, which clearly owed its efficacy to the Imagination of the sufferers, he cured 401 cases out of 629. I am indebted to Dr. Millingen's work for this reference. It is unnecessary to multiply examples of so notorious a fact as the magical power of the influence in question; an influence not only well known to the dentist, but to every one on his way to that dreaded personage, who wishing to believe that the operation is not requisite, begins by doubting whether the pain is after all so very bad, and by the time he sets his foot on the step of the dentist's door, convinces himself that he is entirely free from it. And so he is; at any rate, for a time.

Sciatica.—A singular instance of the influence of the Imagination upon sciatica, may be found in a practice said to have been once common in Devonshire, related in 'The Anatomie of the Elder' of Dr. Martin Blockwick, and cited in Brand's

'Popular Antiquities' (vol. iii):—"The Boneshave, a word perhaps nowhere used or understood in Devonshire but in the neighbourhood of Exmoor, means the sciatica; and the Exmorians, when affected therewith, use the following charm to be freed from it. The patient must lie upon his back on the bank of the river or brook of water, with a straight staff by his side, between him and the water; and must have the following words repeated over him, viz.—

"Boneshave right,
Boneshave straight,
As the water runs by the stave,
Good for the Boneshave."

They are not to be persuaded but that this ridiculous form of words seldom fails to give them a perfect cure."

Painful Joints.—Sir Benjamin Brodie records the case of a young lady who had long laboured under hysterical neuralgia of the hip and thigh, but who immediately lost all her symptoms on being thrown from a donkey which she was riding. He adds:—"Another case has been published as an example of a cure by Divine interposition—the immediate cause of it being the prayers of the patient's spiritual instructor, and his command, 'in the name of the Saviour, that she should get up and walk'" ('Diseases of the Joints,' 1850, p. 287).

When we see that the mental emotions caused by the fall from a donkey, cure a disorder of which Dr. Copland says, there are few less under the control of medical treatment, we can scarcely exaggerate the importance of attacking Disease psychologically.

The case which follows not only shows that the symptoms of an emotional disorder, functional in character, may so closely resemble one involving organic disease, that two distinguished surgeons may confound them (and it may be added that what happened "many years ago" may happen now, if not with experienced hospital surgeons, with general practitioners);* but it also presents a good example of the cure of an hysterical affection of the joint by an exclusively psychical remedy.

"Many years ago," says Mr. Skey, "when I was less familiar

* Brodie confesses he had often made the mistake himself.

with hysteric affections, I attended the case of a young lady of nineteen (suffering from a painful affection of the knee) in conjunction with Mr. Stanley. We both deemed the disease to belong to the class of inflammation, and conjointly adopted the usual remedies so indiscriminately resorted to in all painful affections of the joints. Many weeks elapsed without improvement, and I remember that we discussed with some anxiety the probable issue in abscess, destruction of ligaments, absorption of cartilage, and ultimate amputation of the limb! One day my patient informed me that her sister was going to be married, and that, cost what it might, she had made up her mind to attend the wedding. At this proposal I shuddered. Having expatiated to no purpose on the probable consequences of so rash an act, with all the force of language I could command, I determined to give stability to the joint for the occasion, and I strapped it up firmly with adhesive plaster. On the following day I visited her. She told me she had stood throughout the whole ceremony, had joined the party at the breakfast, and had returned home without pain or discomfort in the joint. Within a week her recovery may be said to have been complete" (xlv, September 22nd, 1866).

Stirring political events, demanding individual action, have a wonderful influence over nervous affections. This fact was exhibited in the first American war. Dr. Rush, after stating that many whose habits were infirm and delicate, were restored to perfect health by the change of place or occupation to which the war exposed them, adds:—"This was the case in a more especial manner with hysterical women, who were much interested in the successful issue of the contest. The same effects of a civil war upon the hysteria were observed by Dr. Cullen in Scotland in 1745–6. It may, perhaps, help to extend our ideas of the influence of the passions upon diseases, to add that when either love, jealousy, grief, or even devotion, wholly engross the female mind, they seldom fail, in like manner, to cure or to suspend hysterical complaints" (lxi, I, p. 132).

Every one has heard the story of the doctor who left his prescription on the table for a lady who suffered from pleurodynia, saying, "Put this to your side," and how the patient literally did so, instead of obtaining the prescribed plaster, but,

in spite of this mistake, derived great benefit from the application.

A parallel case of colic is mentioned by Dr. John Brown, of Edinburgh. He ordered a labouring man some medicine, and giving him the prescription, said, "Take *that*, and come back in a fortnight, and you will be well." As he returned at that time hearty and well, free from the colic and sinking at the stomach, of which he had complained, and with a clean tongue and cool hand and a happy face, Dr. B. was very proud of the wonders his prescription had effected, and said, "Let me see what I gave you." "Oh," said he, "I took it." "Yes," said the doctor, "but the prescription?" "I took *it*, as you bade me. I swallowed it;" that is, the paper itself! But the story is somewhat spoiled for our present purpose by the patient, who was accustomed to relieve his troubles by whiskey, having been ordered to discontinue it, and live on broth and milk instead! So that the Imagination was, I suspect, the least important of the remedies.

SECTION II.—Influence of Mental States upon Disorders involving Excessive or Defective Action of the Voluntary Muscles.

This division, as the corresponding one in previous chapters, is, of course, open to the objection that it is based on a mere symptom, and that it would be more correct to take the nervous system as our guide. It will, however, sufficiently serve our present purpose.

Epilepsy.—Sweetser cites from the 'Medical and Surgical Journal,' vol. xviii, the case of a "lady in the prime of life, of robust health, who was for four years afflicted with epilepsy in a violent degree, the paroxysms returning three or four times a week, continuing for some hours, and leaving the patient in a state of stupor. A variety of medicines had been tried in vain, and the case was considered hopeless, when, on receiving a dreadful mental shock, by the circumstance of her daughter being accidentally burnt to death, the disease entirely and finally left her" (xliii, p. 28.)

The old French Commission on Magnetism found, as I have

already stated, that they could produce convulsions by acting upon the Imagination. But more than this, they found they could by the same talisman terminate them. "To prove incontestably, and to complete the picture of the effects of the Imagination, powerful alike to agitate and to calm, we have," say they, "put an end to a convulsion by the same charm which produced it, the power of the Imagination."

In like manner, in the case of the poor epileptic girl treated by Madame de St. Amour, referred to at p. 65, "*Levez-vous*," said the latter, "*vous êtes guérie*," and the fit subsided.

In the 'Annales Medico-Psychologiques' for 1846, is the report of a case of epilepsy from which the following is condensed: — "Marie-Anne Saverat, Auxerre, was very much frightened when about fourteen years of age, in consequence of which she lost her consciousness and was convulsed. In the evening she had another attack. This alarm occurred when she was subject to headache, irritability, indefinite pains, and other symptoms which indicated a critical period of life.

She had no return of these convulsive attacks until she was 22 years of age, when the catamenia appeared. The seizures are described by Dr. Girard as epileptic, and as followed by momentary incoherence. Soon after, maniacal attacks occurred and became so severe that it was found necessary to place her in an asylum. For about three years she remained there, having become one of the most violent and dangerous patients under Dr. Girard's care, in spite of moral and medical treatment in a variety of forms. She escaped at length from the establishment, and for three months remained at large. Here a new moral force came into action; to escape detection she exerted all the self-control at her command, and became calm and inoffensive. Though she does not appear to have entirely recovered, she remained free from epileptic attacks, coherent, and her habits were industrious and regular. In reporting this case, Dr. Girard observes that if he were asked how a moral influence, which provoked the attacks of epilepsy, can in a milder form (Fear), benefit, or even cure, so serious a malady, he should, in reply, demand an explanation of the cure of an ague by acting powerfully upon the Imagination. He remarks that epilepsy and intermittent fever both belong to the *neuroses*,

and it is not astonishing that they alike respond to the same psychical influences.

Every practitioner is familiar with hysterical contraction of the fingers. A young woman's fingers are firmly flexed upon the palm, and obstinately resist any attempt to extend them. All the orthodox pharmaceutical means may be employed and fail, even if, its true nature being recognised, it is not confounded with the effects of inflammation of the tendons or their thecæ, or of organic cerebral disease; and yet a cure may be performed in a few minutes by what is ordinarily understood by the Imagination, by a sudden thrill of Hope or Faith which masters the tonic spasm, and sets the fingers free. Dr. Bertrand knew a woman whose hand, for thirty-eight years, had been closed as firmly as the fist of a boxer, and could only be opened by very considerable force; yet her hand, to his knowledge, opened in response to the appeal of Madame de St. Amour. Whether it relapsed eventually into its former condition is not stated, but for three days, at least, it remained relaxed, and as serviceable as the other. It is in regard to such cases (whether hysterical, or the remains of old disease) that Burton's pithy observation is but too true:—"An empirick oftentimes, or a silly chirurgeon, doth more strange cures than a rational physician. Nymannus gives a reason—because the patient puts his confidence in him, which Avicenna prefers before art, precepts, and all remedies whatsoever. 'Tis opinion alone (saith Cardan) that makes or mars physicians; and he doth the best cures, according to Hippocrates, in whom most trust."

Mr. Kingdon's case, reported to the Medical Society of London, of an old man, the subject of *paralysis agitans*, who was strikingly influenced by emotional excitement, is referred to by Dr. Moore, in his 'Power of the Soul over the Body,' p. 310. He "had been long unable to walk. The child of a friend was admitted to see him, and so greatly delighted was he that he arose, walked across the room, filled a paper with small shells, gave it to the child, and then sat down as paralytic as before."

Paralysis.—Some years ago an intelligent sailor, whom I know, was left, among others, on one of the desolate Crozet

Islands, in the Southern Ocean, and suffered greatly in consequence. A portion of the crew he describes as "seized with a strange sort of sickness, for they were all drawn up like cripples, some in a sitting posture with their heads resting on their knees, but in no pain, unless you went to move them, or they tried to exercise themselves to regain the use of their limbs." At last, a ship unexpectedly came in sight, and the sailors made large fires as signals of distress. "The sick men," he says, "got half well *at the sight of a fine ship*, some even beginning to crawl about on all fours, and gathering up anything that would burn, to keep the fires going."

It is, however, to definite cases of paralysis that we now wish to refer. Probably, in the above instance, the men suffered from scurvy.

Dr. Bouchut states that in 1849 a little girl, Louise Parguin, whom excessive Fear had rendered dumb, and paralytic in all her limbs, was brought to him. "For two months everything had been done by the physicians, but to no purpose. In despair her father came with his child to Paris. The girl, who had heard of the great city, its great physicians, and the Hôtel Dieu, spoken of only in the most extravagant way, arrived full of faith to be cured. In the evening I saw her dumb and paralytic; and, displeased at finding such a patient in the hospital, made no prescription. She was in the same state the next morning; I put off all treatment during the day. During the day she began to speak, the day after to move her limbs, and on the third day she walked about the halls completely cured. Her faith had saved her" (lxxviii, Jan., 1865).

Dr. Abercrombie relates the following:—"A woman, mentioned by Diemerbroeck, who had been many years paralytic, recovered the use of her limbs when she was very much terrified during a thunder storm, and was making violent efforts to escape from a chamber in which she had been left alone. A man affected in the same manner, recovered as suddenly when his house was on fire; and another who had been ill for six years, recovered the use of his paralytic limbs during a violent paroxysm of anger" (xxviii, p. 399).

Sir Humphrey Davy's well-known case of cure of paralysis was due to aroused hope and expectation. He placed a ther-

mometer under the tongue, simply to ascertain the temperature. As the patient at once experienced some relief, the treatment was continued for a fortnight, when it ceased to be required, for the patient was well. This case is of interest from the application not having been made to the part affected; local excitation was not an element in the treatment; and the Attention was directed rather from than to the paralysed limb.

Dr. Paris relates the circumstance in the following words:— "Early in life he was assisting Dr. Beddoes in his experiments on the inhalation of nitrous oxide. Dr. Beddoes having inferred that the oxide must be a specific for palsy, a patient was selected for trial, and placed under the care of Davy. Previously to administering the gas, Davy inserted a small thermometer under the tongue of the patient, to ascertain the temperature. The paralytic man, wholly ignorant of the process to which he was to submit, but deeply impressed by Dr. Beddoes with the certainty of its success, no sooner felt the thermometer between his teeth than he concluded the talisman was in operation, and, in a burst of enthusiasm, declared that he already experienced the effects of its benign influence throughout his whole body. The opportunity was too tempting to be lost. Davy did nothing more, but desired his patient to return on the following day. The same ceremony was repeated; the same result followed; and at the end of a fortnight he was dismissed cured, no remedy of any kind except the thermometer having ever been used" ('Life of Davy,' p. 74).

The following and the last of these Illustrations has done duty so many times that we are tempted to omit it, but we insert it for a reason which has determined the same course in many other similar instances—the convenience to the reader of being able to put his hand upon the cases which he may be in quest of, bearing upon the same subject.

Herodotus relates that "during the storming of Sardis, a Persian meeting Crœsus was, through ignorance of his person, about to kill him. The king, overwhelmed by this calamity, took no care to avoid the blow or escape death; but his dumb son, when he saw the violent designs of the Persian, overcome with astonishment and terror, exclaimed aloud, 'Oh, man, do

not kill Crœsus!' This was the first time (?) he had ever articulated; but he retained the faculty of speech from this event as long as he lived" (xliii, p. 27). Sweetser quotes from Van Swieten a case of hemiplegia of some years' standing, in a man, who was cured by sudden Terror.

SECTION III.—Influence of Mental States upon Disorders involving the Involuntary Muscles and the Organic Functions.

We have already seen the influence of the Imagination, &c., upon the involuntary muscles (especially the muscular fibre of the intestinal canal), and will only add here three cases; two showing the action of mental states on constipation, and the other on asthma—probably spasmodic. In the illustrations given, however, of other diseases, this action on the muscular coat of the vessels is, to a large extent, exemplified.

Constipation.—In the 'Bibliothèque choisie de Médecine,' tome vi, p. 84, is a good example of the effect produced by the Imagination, during sleep, upon the action of the intestines. The daughter of the Hanoverian Consul, aged 18, having to take a rhubarb purge on the following day, which she especially disliked, dreamed that she had taken the hated dose. Griped by her imaginary rhubarb she awoke, and the bowels acted freely five or six times. Precisely similar is a case which I give on the same authority (Demangeon); that of a monk for whom some purgative had been prepared, to be taken on the following day. He dreamed that he swallowed the medicine; the consequence of which was that he was aroused by the necessity of attending to the calls of nature, and was copiously purged eight times (lx, p. 149). All must admit that any medical man who would engage to ensure the same operations from imaginary as from real rhubarb or senna, would enjoy a fashionable purgative practice.

Dr. Moore gives the following: "An officer in the Indian army was confined to his bed by asthma, and could only breathe in an erect posture; but a party of Mahrattas broke into the camp, and fearing certain death, he sprang out with amazing activity, mounted his horse, and used his sword with great

execution, although the day before he could not draw it from its scabbard" (xxxviii, p. 309).

Warts.—The influence of the Imagination upon warts, trivial as it seems, is really a curious page in the history of this power as a curative agent. They are so apparent that there cannot be much room for mistake as to whether they have or have not disappeared, and in some instances, within my own knowledge, their disappearance was in such close connection with the psychical treatment adopted, that I could hardly suppose the cure was only *post hoc*. In one case, a relative of mine had a troublesome wart on the hand, for which I made use of the usual local remedies, but without effect. After they were discontinued, it remained in *statu quo* for some time, when a gentleman "charmed" it away in a few days. A surgeon informs me that some years ago his daughter had about a dozen warts on her hands. They had been there about eighteen months, and her father had applied caustic and other remedies without success. One day a gentleman called, and in shaking hands with Miss C—, remarked upon her disfigured hand. He asked her how many she had; she replied she did not know, but thought about a dozen. "Count them, will you?" said the caller, and taking out a piece of paper he solemnly took down her counting, remarking, "You will not be troubled with your warts after next Sunday." Now, it is a fact that by the day named, the warts had disappeared and did not return.

"Old women," says Brand (op. cit.), "were always famous for curing warts; they were so in Lucian's time;" and he refers to the time-honoured cure for warts, that of stealing a piece of beef from a butcher's shop, rubbing your warts with it, then throwing it away or burying it; then as the beef rots, the warts decay. I daresay that the excitement of the theft was one element in the cure.

As Dr. Carpenter says, therefore, "the charming away of warts by spells of the most vulgar kind" belong to those "cases which are *real facts*, however they may be explained" (viii, p. 984).

Lord Bacon, in his 'Natural History,' does not fail to refer to the curing of warts by charms, and adduces his own experience, but does not see through the charm the effects of the

Imagination. "I had from my childhood," he says, "a wart upon one of my fingers; afterwards, when I was about sixteen years old, being then at Paris, there grew upon both my hands a number of warts, at the least an hundred, in a month's space. The English Ambassador's lady, who was a woman far from superstition, told me one day she would help me away with my warts; whereupon she got a piece of lard with the skin on, and rubbed the warts all over with the fat side; and amongst the rest, that wart which I had from my childhood; then she nailed the piece of lard, with the fat towards the sun, upon a post of her chamber window, which was to the south. The success was that within five weeks' space all the warts went quite away, and that wart which I had so long endured for company. But at the rest I did little marvel, because they came in a short time, and might go away in a short time again; but the going away of that which had stayed so long doth yet stick with me" (xiv, II, p. 73).

Bacon attributes this result, not to the expectant action of the mind upon the warts, but to the sympathy supposed to exist between the lard and the warts after they had once been in contact. The lard having touched the warts, the melting or wasting away of the former in the sun, caused the disappearance of the latter. The explosion of this vulgar error is one of the triumphs of the inductive process of investigation which Bacon himself initiated.

"Even tumours," says Hunter, "have yielded to the stroke of a dead man's hand" (ii, I, p. 360). A curious illustration of this superstition is given in Brand's 'Popular Antiquities' (vol. iii, p. 147), from a newspaper published in 1777. "After Dr. Dodd had hung about ten minutes, a very decently dressed young woman went up to the gallows in order to have *a wen* in her face stroked by the doctor's hand; it being a received opinion among the vulgar that it is a certain cure for such a disorder. The executioner, having untied the doctor's hands, stroked the part affected several times therewith." Unfortunately we are not told whether the application was successful.

Scurvy.—That nervous diseases are not alone influenced by the Imagination or Expectation, is well shown by the effect produced upon blood diseases. Scurvy, as has been often stated,

was cured solely by this means at the Siege of Breda in 1625. The Prince of Orange, when the city was almost obliged to capitulate, sent word to the sufferers that they should soon be relieved, and provided them with medicines pronounced to be very efficacious in the cure of scurvy. "Three small phials of medicine were given to each physician, not enough for the recovery of two patients. It was publicly given out that three or four drops were sufficient to impart a healing virtue to a gallon of liquor." "We now displayed our wonder-working balsams," continues the narrator, Dr. Frederic Van der Mye; "nor were even the commanders let into the secret of the cheat put upon the soldiers. They flocked in crowds about us; every one soliciting that part might be reserved for their use. Cheerfulness again appears in every countenance, and a universal faith prevails in the sovereign virtues of the remedy . . . . The effect of the delusion was really astonishing; for many quickly and perfectly recovered. Such as had not moved their limbs for a month before, were seen walking the streets sound, upright, and in perfect health. They boasted of their cure by the Prince's remedy . . . . Many who declared that they had been rendered worse by all former remedies, recovered in a few days, to their inexpressible joy, and the no less general surprise, by taking (almost by their having brought to them) what we affirmed to be *their gracious Prince's cure*" (Dr. Lind, 'On the Scurvy,' p. 352). Before this happy experiment was tried they were, states Van der Mye (who was present), in a condition of absolute despair. "This, the terriblest circumstance of all, gave rise to a variety of misery; hence proceeded fluxes, dropsies, and every species of distress (omne chaos morborum), attended with a great mortality."

It is stated on good authority that in 1744, the prospect of a naval engagement between the British and Allied fleet had the effect of checking the scurvy (lxi, I, p. 129).

Such a result of the Imagination as the above shows, as we have said, that its operation is not restricted to affections of the nervous system. John Hunter observes that, while we should naturally expect that diseases connected with the nerves—and those in which their alteration is in the action of parts, not in their structure—would be most affected by the Imagination,

"we find that there are other diseases with which they appear to have little connection that are much affected by the state of the mind" (ii, I, p. 360).

Gout.—"You may see a person with gout," says Abernethy in his Lectures, "who is almost unable to move with pain; but produce a shock on his nervous system by telling him that the house is on fire, and he will scamper about like a lamplighter. As Smollet tells us, in one of his novels, of Captain Lismahago, who went into a house and cried out to an old gentleman with the gout, 'Mad dog! mad dog!' when he jumped up and ran out of the house even into a pond of water opposite." In such examples it is immaterial whether the terror arise from a real or an imaginary cause; the remarkable, though familiar fact is, that a strong mental image or impression infuses new power into the nervous and muscular system. The very fear which in a healthy person may produce excessive muscular contraction—a convulsion—will serve to nerve the limb of the crippled podagric just sufficiently to enable him to escape from danger. But were this all, we could not adduce this occurrence as an illustration of the *cure* of the gout; an obstacle to locomotion being temporarily overcome, but the disease remaining. In the second case, however, adduced in the following illustrations, an actual cure would appear to have been effected.

"A captain of a British ship of war," says Dr. Rush, "who had been confined for several weeks to his cabin by a severe fit of the gout in his feet, was suddenly cured by hearing the cry of 'Fire!' on board his ship. This fact was communicated to me by a gentleman who was a witness of it. Many similar cases are upon record in books of medicine. I shall in another place insert an account of one in which the cure effected by a fright *eradicated the disease from the system so completely as ever afterwards to prevent its return.*" Here is the case, communicated by Judge Rush, the doctor's brother:—

"Peter Fether, the person cured, is now alive, a householder in Reading, seventy-three years of age, a native of Germany, and a very hearty man. The first fit of the gout he ever had was about the year 1773; and from that time till 1785 he had a regular attack in the spring of every year. His feet, hands, and elbows were much swollen and inflamed; the fits lasted

long and were excruciating. In particular, the last fit in 1785 was so severe as to induce an apprehension that it would inevitably carry him off, when he was suddenly relieved by the following accident. As he lay in a small back room adjoining the yard, it happened that one of his sons, in turning a waggon and horses, drove the tongue of the waggon with such force against the window, near which the old man lay stretched on a bed, as to beat in the sash of the window and to scatter the pieces of broken glass all about him. To such a degree was he alarmed by the noise and violence, that he instantly leaped out of bed, forgot that he had ever used crutches, and eagerly inquired what was the matter. His wife, hearing the uproar, ran into the room, where, to her astonishment, she found her husband on his feet, bawling against the author of the mischief with the most passionate vehemence. From *that* moment he has been *entirely exempt from the gout,* has never had the slightest touch of it, and now enjoys perfect health, has a good appetite, and says he was never heartier in his life . . . . To you, who have been long accustomed to explore diseases, I leave the task of developing the principles on which this mysterious restoration from the lowest decrepitude and bodily wretchedness to a state of perfect health, has been accomplished. I well know that toothaches, headaches, hiccoughs, &c., are often removed by the sudden impression of Fear, and that they return again. But to see a debilitated gouty frame instantly restored to vigour; to see the whole system in a moment, as it were, undergo a perfect and entire change, and the most inveterate and incurable disease *radically* expelled, is surely a different thing, and must be acknowledged a very singular and marvellous event. If an old man languishing under disease and infirmity, had *died* of mere fright, nobody would have been surprised at it; but that he should be absolutely cured, and his constitution renovated by it, is a most extraordinary fact, which, while I am compelled to believe by unexceptionable evidence, I am totally at a loss to account for" (lxi, II, p. 180).

Probably no one will be disposed to question the genuineness of this case; but it is often easier to believe a thing has happened, than that it will happen again. I once called upon a

physician whom I found powerless on the couch from an attack of gout. He said he "had been howling with pain for the last twenty-four hours." I ventured to tell him that I had no doubt he would be able to run down stairs into the street if the house were on fire, or a tiger from a menagerie in the neighbourhood should enter the room. He at once replied that, although such an event might cure a *nervous* or *hysterical* disease, it would never cure *gout*. I mentioned several cases in point. He denied the facts, and asserted that no power on earth could possibly make *him* move. Unfortunately (for science), neither fire nor tiger tested the correctness of his opinion; but as he was out again in a couple of days, there is nothing improbable in the view that, by a mental shock, he might have been as suddenly cured as Peter Fether, whose case was chronic and much more severe.

Phthisis.—Terror has appeared to benefit even patients in consumption. According to Dr. Blane a frightful hurricane in Barbadoes in 1780 had one salutary effect—that of benefiting some and curing others who laboured under tubercular disease of the lungs. Of course in the absence of more detailed evidence, especially that obtained from the stethoscope, such a statement must not be taken for more than it is worth. Dr. Rush refers to the cases related by Van Swieten and Smollett of consumptive patients recovering their health from falling into cold water, and inclines to think that in both instances fright and consequent exertion produced a beneficial result—observing that this is only one of many proofs which might be brought forward, of partial or unequal action being suddenly changed into general and equal excitement throughout the system. The passions excited by war are regarded by him as explaining some of the cases of phthisis which are said to have occurred in camp life (lxi, II, p. 83).

Tissot records the following:—A man of letters reached an advanced stage of phthisis, when he consulted a physician. At this period he happened to obtain fresh literary distinction, and was fortunate in other ways; the consequence being that he was greatly delighted. The physical effect was that his pulmonary affection was suspended and remained stationary for a long time (xxxv, Sept., 1867, p. 167).

The same writer cites from Mead the case of a young woman, aged 28, who laboured under all the symptoms of confirmed phthisis, and was threatened with death, when exaggerated fear about the state of her soul, began to torment her. Alarm, increased by the discourse and exhortations of friends, perhaps more pious than enlightened, threw her into a state of religious insanity. The consequence, as respects the bodily condition, was that the hectic fever, the expectoration, the sweats, the emaciation and other unfavorable symptoms disappeared, and led to the hope of cure. But the form of the mental affection having changed to simple melancholy, the hectic returned, the pulmonary disease progressed, and the patient died in the last stage of consumption (op. cit.).

It is important to observe, in the foregoing case, the different effects produced upon lung disease by different states of the mind. The excitement, although in the form of distress acted as a counter-irritant, withdrew the forces marshalled in the thorax, and attracted them to the brain.

Dropsy.—Fear may be regarded as the digitalis of our Remedia Psychica. By influencing the tone of the vital powers, it may act upon the circulation and the absorbents rapidly and effectually. Abernethy's case of the poor woman frightened by a bull, and relieved of her burden, will occur to the reader. Here the relief came through the kidneys. It has been supposed that the fear of death (as well as the fasting he adopted) served to relieve Dr. Johnson of twenty pints of fluid, as recorded by Sir John Hawkins.

Dr. John Pennington, of Edinburgh, records the following: "A sailor in an ascites, fell off the end of the yard into the sea; the weather being calm he was taken up unhurt, but to use the sailor's words, who told me the story, he was frightened half to death, and as soon as he was taken out of the water, he discharged a gallon of urine or more." Dr. Pennington observes, "the sedative operation of Fear was, no doubt, the cause of the cure."

Dr. Rush refers to the case of a young woman (19 years of age) who had taken the usual remedies for ascites without any benefit. Dr. Hull was consulted and immediately proposed that the operation of tapping should be performed. "To this

she objected, but so great was the fear of this operation, which the proposal of it suddenly excited in her mind, that it brought on a plentiful discharge of urine, which in a few days perfectly removed her disease." Again, a lady with dropsy in Philadelphia was informed that tapping was necessary, and was much terrified upon hearing it. "I saw her two days afterwards, when she told me, with a smile on her countenance, that she hoped she should get well without tapping, for that she had discharged two quarts of water, in the course of the day after we had advised her to submit to that operation. For many days before she had not discharged more than two or three gills in twenty-four hours" (lxi, II, p. 114). However, in this case the operation was subsequently performed. On the occasion of a second paracentesis, Fear again appeared to be the cause of a remarkable stimulation of the kidneys. Two similar cases fell under the observation of this physician. We have in a previous chapter (p. 310) reported an interesting case of this kind, in order to illustrate the influence of emotional excitement on the organic functions. In this and several other instances, the illustrations which we gave for this purpose were necessarily examples also of the cure of disease.

Intermittent Fever.—A chapter might be written simply on the charms supposed to be of efficacy in ague. One remedy was wearing round the neck the mysterious word "Abracadabra," written in a peculiar manner. Chips from the gallows, placed in a bag and hung round the neck, or put on the skin, "will cure the ague, or prevent it," says Grose. The same result was expected from the halter of a criminal who had been executed.

In Brand's 'Popular Antiquities' (vol. iii, p. 149) from which the above is taken, occurs the following: "Mr. Douce's MS. notes say, 'It is usual with many persons about Exeter who are affected with ague, to visit at dead of night the nearest cross-road five different times, and there bury a new-laid egg. The visit is paid about an hour before the cold fit is expected; and they are persuaded that with the egg they shall bury the ague.' I shall here note another remedy against the ague mentioned as above, viz., by breaking a salted cake of bran, and giving it to a dog when the fit comes on, by which

means they suppose the malady to be transferred from them to the animal."

"Amulets," says Adams, in his charming and learned commentary on Paulus Ægineta, "were very much used in ancient times for the cure of quartans. Alexander Traillian had great confidence in them. Galen supposed that they owed their virtues to the physical properties of the substances which were appended" (vol. i, p. 248).

It is stated that the ague was very successfully cured by Faith, on a large scale, by Ferrarius. In the course of a twelvemonth he cut the disease short in about fifty persons solely by slips of paper, on which he inscribed the word "febrifuge," and gave them to the patients with the instruction that they should cut off a letter every day. A Spanish lieutenant recovered by the time he arrived at the sixth letter (xxxvi, 1850, p. 161). John Hunter says, "agues have been cured by charms, which have been used with a thorough conviction of their being a sovereign remedy. I am apt to suppose that a spider's web, when taken for an ague, cures in the same way; at least in one case, for on giving it without the patient's knowledge it had not the slightest effect, but by persuading the patient that it was a spider, the effect was produced; at least the disease did not return" (ii, I, p. 360).

Intoxication.—Among the remedies for drunkenness, Dr. Rush (lxi, II) enumerates Terror, and gives in illustration the story of some young merchants who got drunk in a cabin on James's river, and were carried away by a sudden rise of the river in consequence of a heavy fall of rain. In great danger and, no doubt fear, they floated in the current for several miles. "When they reached the shore that saved their lives, they were all sober" (p. 171). Another remedy he mentions is the excitement of a fit of Anger, and relates, on the authority of Dr. Witherspoon, the history of a man in Scotland, who was always cured of a fit of drunkenness by being made angry. The way to make him angry was, not to talk against the sin of drunkenness, but against *religion.*

In connection with psychical cases for a state of actual drunkenness may be mentioned a psychical antidote to intemperate habits from the same author, the emotion in this case

being "Resentment," but it would be more correct to say that it exhibits the power of the Will over the thirst for drink. A citizen of Philadelphia had made many unsuccessful attempts to cure his wife of drunkenness. At length, despairing of her reformation, he purchased a hogshead of rum, and after tapping it, left the key in the door of the room in which it was placed, as if he had forgotten it. This design was to give his wife an opportunity of drinking herself to death. She suspected this to be his motive, in what he had done, and suddenly left off drinking" (p. 175).

A drunkard may be cured of his vice by the association of ideas. Immediately after drinking some spirits, a gentleman became the subject of a painful attack of rheumatism. The attack was due to exposure to wet, but he associated it with the toddy he had taken, and from that time did not cease to loathe that liquor. Whenever he thought of it, his imagination pictured the accompanying sensation of suffering in his joints; his revulsion being automatic rather than dependent on any process of reasoning. Dr. Rush points out that Moses availed himself of this principle of our mental constitution, when he made the Israelites drink the nauseous and bitter solution of the Golden Calf, by associating which, ever after, with the sin of idolatry, they were likely to hold it in detestation.

The influence of the state of the mind in modifying the ordinary action of intoxicating drinks upon the system, is shown by the circumstance that if the attention or feelings are absorbed in any matter of interest, a much larger amount can be imbibed without producing an effect on sensation and motion, than would otherwise be the case.

Threatened Death.—When treating of the influence of psychical agents upon the body in causing disease, we found them sufficiently powerful to cause death itself. Conversely, there is ample evidence to show that, while the dead cannot be restored to life, the patient threatened with death may recover through the instrumentality of mental impressions. It is not necessary to dwell upon the salutary influence exerted by any circumstance which happens to excite the emotions of Hope and Joy in the sick-room; or the beneficial influence of satisfactorily settling affairs of business, &c. "I have known many

recoveries from imminent danger," observes Dr. Badeley, "by the relief which the mind experienced after making a will; and most of that danger might have been prevented by having made it when in health."

I have now sufficiently illustrated the remarkable influence exerted by mental states, as Imagination, Expectation, Faith, Hope, and Joy, in curing disease. To these cases might have been added a large number which I have collected together, in which the same influence was present, and was, in all probability, the operative cause, but which I have rejected because they might be objected to, inasmuch as certain agencies were employed, to the power of which the cures were, and still are, by many persons, attributed. Those who have visited the continental churches will remember the large number of crutches, sticks, splints, &c., which have been left there by those who have (there is no reason to doubt), been cured or relieved of contracted joints, rheumatism, and palsy, by prayers offered up to some saint, or by the supposed efficacy of their relics. Although I have no doubt that the influence of Imagination and Faith sufficiently explains the success of the method adopted in these cases, I exclude them as evidence for the reason above stated. So with the cures performed by Prince Hohenlohe,* as the Roman Catholic might attribute them to supernatural agency transmitted through a Priest; as the modern spiritualist†

* His name and titles had probably much to do with his influence. They were Alexander Leopold Franz Emmerich, Prince of Hohenlohe-Waldenburg-Schillingsfürst, Archbishop and Grand Provost of Grosswardein, Hungary, and Abbot of St. Michael's at Gaborjan. Born 1794, in Waldenburg; educated in several Universities; he officiated as Priest at Olmütz, Munich, &c. When 26, he met with a peasant who had performed several astonishing cures, and from him caught the enthusiasm which he subsequently manifested in healing the sick. He constantly appealed to their faith in his power.

† See in the 'Spiritualist Magazine,' Nov., 1867, an article by William Howitt, from which the particulars given in the text are taken. In regard to Spiritualism, we would pursue the same course as in Animal Magnetism (see p. 5), not say that the alleged phenomena are impossible *because* the Imagination, &c., can work wonders, but simply confine ourselves, for our present object, to the collection of cases which certainly are the result of psycho-physical influences. If the spiritualistic cases of healing are not more wonderful, then clearly we are not justified in calling in another principle to explain them. If they are, by all means utilise them.

maintains that he was a Medium; and as the Animal Magnetist claims them as the result of a magnetic influence passing from the princely healer to the patient, I shall not adduce them as illustrations of the action of the Mind upon the Body in the cure of disease. The letter written by a Prince of the Blood—the ex-King of Bavaria—to the Count von Sinsheim, describing his own case, is, however, too curious to be omitted here :—

My dear Count,

There are still miracles. The ten last days of the last month, the people of Würzburg might believe themselves in the times of the Apostles. The deaf heard, the blind saw, the lame freely walked, not by the aid of art, but by a few short prayers, and by the invocation of the name of Jesus. . . . On the evening of the 28th, the number of persons cured, of both sexes, and of every age, amounted to more than twenty. These were of all classes of the people, from the humblest to a prince of the blood, who, without any exterior means, recovered, on the 27th at noon, the hearing which he had lost from his infancy. This cure was effected by a prayer made for him during some minutes, by a priest who is scarcely more than 27 years of age—the Prince Hohenlohe. Although I do not hear so well as the majority of the persons who are about me, there is no comparison between my actual state and that which it was before. Besides, I perceive daily that I hear more clearly. . . . My hearing, at present, is very sensitive. Last Friday, the music of the troop which defiled in the square in the front of the palace, struck my tympanum so strongly, that for the first time, I was obliged to close the window of my cabinet. The inhabitants of Würzburg have testified, by the most lively and sincere acclamations, the pleasure which my cure has given them. You are at liberty to communicate my letter, and to allow any one who wishes, to take a copy of it.

Louis, Prince Royal.

Bruckenau; July 3rd, 1822.

So, likewise, Professor Onymus, of the University of Würzburg, reporting on the cases cured by Prince Hohenlohe which he himself witnessed, gives the following :—

"Captain Ruthlein, an old gentleman of Thundorf, 70 years

of age, who had long been pronounced incurable of paralysis, which kept his hand clenched, and who had not left his room for many years, has been perfectly cured. Eight days after his cure he paid me a visit, rejoicing in the happiness of being able to walk freely.

"A man, of about 50, named Bramdel, caused himself to be carried by six men from Carlstadt to the Court at Stauffenburg. His arms and legs were utterly paralysed, hanging like those of a dead man, and his face was of a corpse-like pallor. On the prayer of the Prince he was instantly cured, rose to his feet, and walked perfectly, to the profound astonishment of all present.

"A student of Burglauer, near Murmerstadt, had lost for two years the use of his legs; he was brought in a carriage, and though he was only partially relieved by a first and second prayer of the Prince, at the third he found himself perfectly well.

"These cures are real, and they are permanent. If anyone would excite doubts of the genuineness of the cases operated by Prince Hohenlohe, it is only necessary to come hither and consult a thousand other eye and ear witnesses like myself. Everyone is ready to give all possible information about them."

Father Mathew, in our own day, if not so successful as Prince Hohenlohe, relieved a large number of persons, and on exactly the same principle. The reason which induced us not to employ the Prince's cures in evidence, applies therefore equally to his. Let us, however, assume for a moment that in both cases their prayers, as affirmed by themselves and their adherents, were the cause of their remarkable success. The difficulty at once arises that in Father Mathew's case, the same diseases which he had cured during his lifetime, were just as effectively relieved after his death, by visiting the good Father's tomb, in the firm faith that a miracle would be performed. The readers of his Life know that many a cripple left his crutch there. In such instances, the analysis of the agencies possibly at work is rendered much easier from the absence of several to which some would assign, in other instances, a therapeutic virtue. No living body, therefore no animal magnetism. No infinitesimal doses, therefore no homœopathy. No drugs

of any kind, therefore no physic. No Medium, therefore no spiritual influence of that kind. No priest, therefore no prayers over the patient.

All these being eliminated, nothing would seem to remain but the influence of expectant Faith, an influence called into powerful operation by the supposed miraculous power of the deceased, augmented doubtless by the excitement occasioned by crowds flocking, with a common sympathy, to the same spot. A patient, bedridden for years, is carried or manages to crawl there, the deepest emotions are stirred—hope, longing, belief—and she finds a new power in her system; an impetus is conveyed to the limbs, and she walks home with ease. Her cure kindles the faith of others, and it is not unlikely that the combined influence of her sudden recovery of the use of her limbs, and the imaginary virtues of the tomb, would restore some to health, for whom the latter alone would have been insufficient. The epidemics of cure are as definite, and admit as easily of study, as the epidemics of disease. They will also equally repay the labour bestowed upon tracing their causes, their rise and decline, and their extent. Why they should decline is, perhaps, more difficult to explain than why they should arise.

Again, from the same point of view, although I do not include cases of insanity in my collection of illustrations, since they are examples of the influence of the mind upon its own organ, I may refer to the means employed till quite recently at Gheel* for the cure of the insane.

In 1862, when I visited the "City of the Simple," I saw the room where the lunatic is lodged, when the evil spirit with which he or she is possessed, is exorcised. (Here it is orthodox

* There is a legend that in the ninth century the daughter of an Irish King (Dymphna) fled from her father's persecution on account of her having become a Christian. He followed her to Gheel, and, having discovered her retreat, beheaded her. Several lunatics who happened to witness the deed were cured on the spot. Admitting the fact, the cures at this stage of the history, may be referred to a powerful and painful emotion. The cures were, of course, regarded as miraculous, and Dymphna was duly canonized. The number who subsequently flocked to her tomb was so great that, in course of time, a colony sprung up and a sane population became accustomed to take charge of the insane in their humble cottages. I visited the Church of St. Dymphna, where her acts are recorded in oak, from the day of her birth to that of her death. Here her relics are preserved, and are still occasionally employed to minister to minds diseased.

to regard madness as identical with possession.) Six months previously a lady had occupied it. The priest came to her every day with a relic, and performed the customary incantations. The result was perfect recovery within nine days. If not cured within that period, a patient is allowed to stay eighteen days; and then, if no change takes place in his condition, he is discharged. The cures, I was informed, have been numerous; but now scepticism is undermining the superstition upon which they depend; the doctors feel ashamed of the delusion; and the priests have to yield their claims to those of legitimate medicine, and are very likely half-ashamed themselves. Patients who would have been sent to the church of St. Dymphna, are placed in the new Asylum of Gheel, but if only physical therapeutics are employed, they may not recover so quickly. There is no reason, whatever, to doubt these asserted cures resulting from a belief in the efficacy of the fusty old bones of the saintess. As a ποῦ στῶ, upon which Faith may repose securely, they serve just as well as a pill of bread or a globule of sugar of milk.

We have also in this chapter excluded cases of cure by the Royal Touch, for although when they occurred, they may fairly be attributed to the expectant Faith of the patient, some would urge that the possibility of a mesmeric influence passing from A to B was not out of the question. To prevent any exception being taken, we therefore dismiss such instances, but can hardly avoid referring to one case which affords an amusing proof of the important results which may flow from attributing such cures to a wrong source. Browne, of Norwich, surgeon to King Charles II, published a book called 'Adenochoiradelogia, or a Treatise of Glandules, and the Royal Gift of Healing them.' In it is the account of the case of a child which we cite here:—"A nonconformist child, in Norfolk, being troubled with scrofulous swellings, the late deceased Sir Thomas Browne, of Norwich, being consulted about the same, his majesty being then at Breda or Bruges, he advised the parents of the child to have it carried over to the king (his own method being used ineffectually); the father seemed very strange at his advice, and utterly denied it, saying the touch of the king was of no greater efficacy than any other man's.

The mother of the child, adhering to the doctor's advice, studied all imaginable means to have it over, and at last prevailed with her husband to let it change the air for three weeks or a month; this being granted, the friends of the child that went with it, unknown to the father, carried it to Breda, where the king touched it, and she returned home perfectly healed. The child being come to its father's house, and he finding so great an alteration, inquires how his daughter arrived at this health. The friends thereof assured him, that if he would not be angry with them, they would relate the whole truth; they having his promise for the same, assured him they had the child to be touched at Breda, whereby they apparently let him see the great benefit his child received thereby. Hereupon the father became so amazed that he threw off his Nonconformity, and expressed his thanks in this manner:—'Farewell to all dissenters, and to all nonconformists; if God can put so much virtue into the king's hand as to heal my child, I'll serve that God and that king so long as I live, with all thankfulness.'" Thus the importance of a knowledge of the influence of Mind upon Body is shown even in regard to the choice of a religion. It is a pity that there was change of air as well as the touch of Royalty to disturb the inference drawn from the improvement following the latter. If it be attributed to change of scene rather than air, we might claim the agency as psychical. Mere change of locality, as is well known, will often benefit a patient, although the change, as regards air, is a change for the worse. The remedy acts upon the body through the mind or imagination. A hospital patient has an ill-conditioned sore, and does not go on well; he is removed to another ward, and the vital action in the part may at once assume a healthy appearance. A little psychical nitrate of silver has been employed, and has stimulated the granulations more effectually than its local application previously.

In reference to the Royal Touch, there is a curious passage in Aubrey. "The curing of the King's Evil," he says, "by the touch of the king, does much puzzle our philosophers, *for whether our kings were of the house of York or Lancaster*, it did the cure for the most part." In other words, the Imagination belongs to no party, guild, or creed.

CHAPTER XVII.

PSYCHO-THERAPEUTICS.

PRACTICAL APPLICATION OF THE INFLUENCE OF THE MIND ON THE BODY TO MEDICAL PRACTICE.

We now approach the consideration of the question, How can the foregoing facts, proving, as they do, the great influence which mental states exert over the body in disease, be practically applied for therapeutic purposes? Can this unquestionable power be controlled and directed? Ought we deliberately to cause a mental shock? We have seen that gout may be cured by the patient's window being smashed by a waggon, or by his house being set on fire. May we imitate these accidents to obtain the same end?

SECTION I.—General Influence of the Physician upon the Patient in Exciting those Mental States which act beneficially upon the Body in Disease.

No one disputes that the physician and the surgeon can and constantly do make use of this agent, in their mode of addressing their patients, in the hope and confidence which they endeavour to inspire, and in the removal of everything calculated to depress them.

> "Sunt verba et voces, quibus hunc lenire dolorem
> Possis, et magnum morbi deponere partem."

It is, however, a striking illustration of the relative degree in which psychical and physical remedies have been cultivated that in Pereira's 'Materia Medica,' which includes in its range the

Remedia Psychica, the observations upon these remedies are compressed within three pages. While, however, he points out the difficulty of producing, regulating, and controlling psychical remedies, he allows that they are by no means unimportant, and ought not to be neglected. He disposes of the influence of the Imagination in two lines.

Few physicians have had more practical experience of disease than the celebrated Dr. Rush, and his testimony to the good effects of inspiring confidence, even in active disease, is clear and forcible. "I have," he says, "frequently prescribed remedies of doubtful efficacy in the critical stage of acute diseases, *but never till I had worked up my patients into a confidence bordering upon certainty of their probably good effects.* The success of this measure has much oftener answered than disappointed my expectations" (lxi, I, p. 257). He attributes the cure to the vigorous concurrence of the will with the action of the medicine.

In the 'Lancet' of December 18th, 1869, Dr. John Tanner advocates the treatment of hysterical aphonia by electro-magnetism, applied to the tongue only, and states that in more than fifty cases he had applied it without being unsuccessful in any. He reports four cases:—In the first the patient's voice returned with a loud scream; in the second the voice at once returned; in the third the voice returned, was lost again in about ten minutes, and was permanently restored after a repetition of the remedy; in the fourth the voice instantly returned. In his commentary upon these cases Dr. Tanner remarks, "It is all important, before you apply electro-magnetism, to convince your patient *that she will be cured;* for if you fail in your powers of persuasion, it is probable the result of its application will not be satisfactory." This almost amounts to a confession that the application is little worth in itself, but that the cure is really effected by powerfully appealing to the Imagination, and making use of means which the patient may well believe calculated to produce a decided effect.

Whether, and to what extent, the physician may avail himself of Fear in the treatment of disease, has often been discussed. It cannot be denied that, while inflicting a great deal of suffering, it has been successful in not a few instances, as in the case

of the lady that was cured of the vapours by a Noble Lord, who arranged that in the midst of one of her most violent fits, four mutes dressed in white should enter her apartment, slowly approaching, and take her without violence in their arms, and without giving her time to recollect herself, convey her into a distant chamber hung with black and lighted with green tapers ! ! (lxxxvi, p. 26). Dr. Crawford, of Baltimore, is related to have advised a patient, who fancied he was dying of liver disease, to travel. On returning, he appeared to be quite well, "but upon receiving information of the death of a twin brother, who had actually died of a scirrhous liver, he immediately staggered, and falling down, cried out that he was dead; and, had, as he always expected, died of a liver complaint. Dr. Crawford being sent for, immediately attended; and on being informed of the notion which had seized the hypochondriac, exclaimed 'Oh, yes, the gentleman is certainly dead, and it is more than probable his liver was the death of him. However, to ascertain the fact, I will hasten to cut him open before putrefaction takes place.' He called for a carving knife, and whetting it, as a butcher would to open a dead calf, he stepped up to him, and began to open his waistcoat. The hypochondriac became so terribly frightened, that he leaped up with the agility of a rabbit, and crying out 'Murder! murder! murder!' ran off with a speed that would have defied a score of doctors to catch him. After running a considerable distance, until he was almost exhausted, he halted; and not finding the doctor at his heels, soon became composed. From that period this gentleman *was never known to complain of his liver;* nor had he for more than twenty years afterwards, any symptoms of this disease!" (op. cit., p. 149).

Fear no doubt acts beneficially through the Will—that is to say, in presence of a greater evil, the patient resolves not to yield to the lesser one, knowing that if he does not yield, he will escape its infliction. Under this class, fall those numerous cases in which nervous symptoms—convulsions, spasms, &c.—are at once controlled by the threat of unpleasant consequences.

We cannot, however, expect that beyond the salutary awe, which in some nervous cases it may be desirable for the patient to feel for the physician, the emotion of Fear will be beneficially

employed, and we fully unite with Esquirol in his remarks on its employment in epilepsy. "We reject," he says, "as dangerous the salts of copper and nitrate of silver, how many miracles soever may be attributed to their use. We can say as much of Fear, which is recommended by some rash persons. But who can calculate the effects of Fear, and consequently, who would dare to make use of it, as a curative agent?"

SECTION II.—Importance of arousing the Patient's Will.

The power of the Will in resisting disease, apart from the influence of the Imagination or the concentration of the Attention, is unquestionable. "Oh, if I could once make a resolution, and determine to be well!" exclaimed the German physician Walderstein.

The poet Churchill said—

> "The surest road to health, say what they will,
> Is never to suppose we shall be ill;
> Most of those evils we poor mortals know
> From doctors and *imagination* flow."

It is a pity, however, that we have to confess that the poet died at the early age of thirty-four (of fever). We must conclude that his dissipated life neutralized the good effects likely to result from supposing that he should not be ill.

At a *séance* of the Royal Academy of Medicine of Paris, Dr. Barthélemy expressed his conviction that the symptoms of hydrophobia in man were mainly due to the imagination and irritability of the patient. In proof of this he adduced his own case. He had introduced his finger into the throat of a mad dog, and drew it out covered with frothy saliva; in drying it he observed that he had a slight excoriation on his finger. He lightly cauterized it, but ten days after, he experienced a sense of constriction about the throat. He felt alarmed; the difficulty of swallowing increased until he could not drink anything, and the sight of water caused spasms. The Will, however, was strongly exercised, and at last gained the day; the symptoms gradually abated, and in about a week he was well (lx, p. 140).

An event in the life of Andrew Crosse, the electrician, illus-

trates, in a striking manner, the power of the Will over threatened disease, the symptoms in his case being those of hydrophobia. It would seem to illustrate the force of this influence, not only directly over the incipient irregular action of certain motor nerves and muscles, by forcing them into healthy exercise, but over the automatic action of the cerebrum itself, by resolutely arresting the train of ideas which have been excited. If "an act of the Will frequently excites such changes in the brain as to arrest an incipient paroxysm of angina pectoris or epilepsy" (Laycock), there seems no reason why it should not exert the same influence over the symptoms present in this case.

Mr. Crosse was severely bitten by a cat, which died the same day hydrophobic. He appears to have thought little of the circumstance, and was certainly not nervous or imaginative in regard to it. Three months, however, after he had received the wound, he felt one morning great pain in his arm, accompanied by extreme thirst. He called for a glass of water. The sequel will be best told in his own words:—"At the instant that I was about to raise the tumbler to my lips, a strong spasm shot across my throat; immediately the terrible conviction came to my mind that I was about to fall a victim to hydrophobia, the consequence of the bite that I had received from the cat. The agony of mind I endured for one hour is indescribable; the contemplation of such a horrible death—death from hydrophobia—was almost insupportable; the torments of hell itself could not have surpassed what I suffered. The pain, which had first commenced in my hand, passed up to the elbow, and from thence to the shoulder, threatening to extend. I felt all human aid was useless, and I believed that I must die. At length I began to reflect upon my condition. I said to myself, either I shall die or I shall not; if I do, it will only be a similar fate which many have suffered, and many more must suffer, and I must bear it like a man; if, on the other hand, there is any hope of my life, my only chance is in summoning my utmost resolution, defying the attack, and exerting every effort of my mind. Accordingly, feeling that physical as well as mental exertion was necessary, I took my gun, shouldered it, and went out for the purpose of shooting, my arm aching the while intolerably. I met with no sport, but *I*

walked the whole afternoon, exerting, at every step I went, a strong mental effort against the disease. When I returned to the house I was decidedly better; I was able to eat some dinner, and drank water as usual. The next morning the aching pain had gone down to my elbow, the following it went down to the wrist, and the third day left me altogether. I mentioned the circumstance to Dr. Kinglake, and he said he certainly considered that I had had an attack of hydrophobia, which would possibly have proved fatal had I not struggled against it by a strong effort of mind." ('Memoirs of Andrew Crosse,' p. 125.)

In hysteria, the influence of the Will *versus* the reflex action of voluntary muscles is constantly seen. Mr. Skey records the case of a young lady of sixteen, who for many months had been suffering from inversion of the left foot, which was twisted at right angles with the other, and was treated by orthopœdic surgeons with an elaborate apparatus of splints. Neither they nor Mr. Skey (though he recognised the nature of the affection) succeeded in curing it. Psychical agents, however, effected a cure in a few minutes. She willed to use her foot like other people, and she did. "She accompanied her family to a ball, her foot, as she entered the ball-room, being not yet restored to its normal position. She was invited to dance, and under this novel excitement she stood up, and to the astonishment of her family, she danced the whole evening, having almost suddenly recovered the healthy, muscular action of the limb. She came to see me," adds Mr. Skey, "two days afterwards. She walked perfectly well into my room, and paced the room backwards and forwards with great delight. The actions of the limb were thoroughly restored, and all trace of the previous malady had disappeared" (xlv, October 13th, 1866). Fortunately no quack medicine or doctor aroused the Will in this case; fortunately, not only because they would have had the credit of the cure, but because the reality of the disorder would have been denied by those who have still to learn that such recoveries are possible, and that it is one thing to admit the virtue of inert remedies, and another thing to recognise the secret of their frequent success.

The influence of the Will in controlling disease has already

been incidentally referred to in the case of Irving. His own account of an attack of cholera may be made use of advantageously here.* During the invasion of the cholera in 1832 he was "seized with what was in all appearance, and to the conviction of medical men when described to them, that disease which has proved fatal to so many of our fellow creatures." He had risen in perfect health at his usual early hour. By breakfast time he had become very cold, and was labouring under severe pain. His appearance shocked his friends. Vomiting succeeded, and wringing or gnawing pains,† and being so weak that he could not sit up, he lay on the bed wrapped in blankets till he had to set out to preach at half-past eleven. It appears that he had a little brandy and arrowroot, but felt no better. With sunken eyes, pallid cheeks, and an altogether ghastly appearance, he tottered to the church, a quarter of a mile distant, and found another minister officiating for him. He was tempted to shrink back, but summoned resolution to tell his beadle to go into the pulpit and inform him that he would shortly take his place. In the meantime he stretched himself on three chairs in the vestry before the fire. "Even as I shifted my position I endured much suffering, and was almost involuntarily impelled to draw up my limbs in order to keep the pain under. Nevertheless, when I stood up to attire myself for the pulpit, and went forward to ascend the pulpit stairs, the pains seemed to leave me." His sight was dim, his head swam, he breathed with difficulty, he laid hold on the pulpit sides and looked wistfully about, wondering what would befall him. The crisis came. "That instant a cold sweat, chill as the hand of death, broke out all over my body, and stood in large drops upon my forehead and hands. From that moment I seemed to be strengthened." He preached upwards of an hour with more unction than he had ever done before. After the service he walked home, eating little or nothing. Yet he preached in the evening in a crowded schoolroom, and next morning rose before the sun to pursue "with renewed strength"

* It should be observed that he held and preached that disease is sin, and that no one with faith need or ought to yield to it.

† A medical friend informs me that to his knowledge, Irving laboured under severe diarrhœa, and that his state at one time was that of dangerous collapse.

what he regarded as his course of duty. The narrative, Mrs. Oliphant suspects, may cause some to smile, but it is impossible not to admire so resolute though mistaken a man ('The Life of Edward Irving,' vol. ii, pp. 309-13).

SECTION III.—Systematic Excitement of a definite Expectation or Hope, in regard to the beneficial Action of totally inert Substances.

We may in a definite manner excite Hope, and direct it in a particular channel, by leading the patient to expect a certain result from drugs in which he has faith, but which are *totally* inert.

That this course may be systematically and successfully pursued, the cases which follow prove:—

M. Lisle, who has, among French physicians, especially recognised the importance of acting upon the Imagination, making it, as he expresses himself, "un levier puissant, plus précieux que tous vos remèdes," but who declares he is not able to explain why it is so potent an agent,* adopts the plan of treating some of his cases by pills composed of nothing more potent than bread crumb, and the results are what might be expected from the facts contained in this work. Of these pills, covered with silver leaf, he has two sets; the boxes containing one set labelled "Pilules argentées anti-nerveuses," and the others "Purgatives." He had in his establishment a hypochondriac who believed himself to be the victim of obstinate constipation, although in point of fact the bowels were regular. Of purgatives he had taken every form, but he affirmed, without any result. Dr. Lisle refused to give him any medicine, and was in consequence incessantly importuned, and even abused by his patient. At last, one day, wearied out, he professed to yield to his solicitations, and told him he was about to give him the most violent purgative he knew, and that it would certainly

* "I am not German or metaphysician enough to venture into this obscure region. I prefer frankly confessing my ignorance, and even that I only know that I know nothing about it. The fact stares me in the face, patent and indisputable, and *that* suffices me."

render him very ill. With the greatest delight he obeyed Dr. Lisle's orders to take five of the pills from his "purgative" box, an interval of a quarter of an hour being allowed between each. After the third dose the patient was well purged, and within seven hours the bowels were acted upon more than twenty times. He was jubilant at the successful operation of this new purgative, but was almost in a state of collapse with the attack, which, Dr. Lisle says, he can only compare "à une attaque de cholérine des plus intenses." However, this proved to be a crisis in the patient's history, and the commencement of his recovery from Delusional Insanity ('L'Union Médicale,' October 23rd, 1861).

The following series of cases from 'The British and Foreign Medical Review,' January, 1847, was communicated by a naval surgeon, whom the editor, Sir John Forbes, characterises as an officer of long standing and much experience, whose name and high character were known to him:

"A very intelligent officer had suffered for some years from violent attacks of cramp in the stomach. He had tried almost all the remedies usually recommended for the relief of this distressing affection; and for a short period prior to coming under my care, the trisnitrate of bismuth had been attended with the best results. The attacks came on about once in three weeks, or from that to a month, unless when any unusual exposure brought them on more frequently. As bismuth had been so useful, it, of course, was continued; but notwithstanding that it was increased to the largest dose that its poisonous qualities would justify, it soon lost its effect. Sedatives were again applied to; but the relief afforded by these was only partial, while their effect on the general system was evidently very prejudicial. On one occasion, while greatly suffering from the effect of some preparation of opium, given for the relief of these spasms, he was told that on the next attack he would be put under a medicine which was generally believed to be most effective, but which was rarely used, in consequence of its dangerous qualities, but that, notwithstanding these, it should be tried, provided he gave his assent. This he did willingly. Accordingly, on the first attack after this, a powder containing four grains of *ground biscuit* was administered every seven

minutes, while the greatest anxiety was expressed (within the hearing of the party), lest too much should be given. The fourth dose caused an entire cessation of pain. Half-drachm doses of bismuth had never procured the same relief in less than three hours. For four successive times did the same kind of attack recur, and four times was it met by the same remedy, and with like success! After this my patient was ordered to join another ship on a different station."

In the next case, treated by the same medical man, constipation was relieved by the psychical method.

"A seaman had suffered from four successive attacks of constipation. So far as could be detected, there was no organic disease to account for its occurrence. The symptoms were such as usually follow protracted constipation of the bowels; and on all four occasions large and repeated doses of the strongest purgatives (croton oil included), powerful enemata, cold affusion, and hot baths had all been required to be persevered in to procure relief. On the fifth attack, he was put under grs. ij of bread pill every seven minutes; much anxiety being, of course, expressed to guard against any over-dose, as well as to watch the effect of what was thus given. Within two hours he became sick (*one of the symptoms expected from the medicine*), and his bowels were freely open almost immediately after; nor did they again become constipated, so far as I am aware."

Severe gastric and intestinal pain was removed in the following interesting case, by a like appeal to the Imagination, and is graphically described by the same hand:—

"In July, 1845, the company of H.M.S. —— were attacked with an epidemic bowel complaint, terminating in simple diarrhœa in some, but going on to dysentery in many. In every one of the latter cases, tapeworms (whether a cause or merely an effect, I am unable as yet to divine) showed themselves. Amongst others who suffered was H. B—, a first-class petty officer, who had but a mild attack of dysentery, but who was much distressed towards the latter part of his attack, by tapeworm appearing in considerable quantities. As the dysenteric symptoms disappeared, these worms were attempted to be dislodged by every means that could be devised, and for a time it was supposed these means had been successful; but, as I feared, at too great

a sacrifice, seeing that the pain arising (as I fancied) from the large doses of powerful medicine necessary to effect this difficult object, continued around the pyloric orifice of the stomach and upper portion of the small intestines, to be most distressing. Counter-irritations were applied until the skin became callous, sedatives administered until the man's senses became muddled, but no course of treatment seemed to afford the least relief. This being so, I determined to try the effect of mental influence. Stating to him, as I did to the other men, that, as his disease was most obstinate, so was it necessary to have recourse to desperate means to relieve it; that, with his sanction, I would therefore put him under a medicine which it was most necessary to watch with the greatest attention, lest its effects should prove most prejudicial, perhaps fatal, &c. Having by these statements made an impression, it became necessary to keep it up. This was done by repeated visits, at all hours of the day and night, and by expressing on these occasions the most intense anxiety as to the effect of the very powerful and dangerous medicaments. This was not a case in which a sudden effect could be expected to be produced, whatever might be the means employed. Symptoms of disease existed which bore too close a resemblance to those of an organic order to admit of hope of a sudden, if even of tardy, relief. Hence the pills (*bread*, of course) were given every sixth hour only. Within twenty-four hours the man's sufferings were decidedly less. Within four days he was almost free from pain. On the sixth day he was quite so, his pills were omitted, and at the end of a fortnight he was again at duty with a clear eye, a healthy skin, and was rapidly regaining his flesh. Here, as in most cases where this method has been tried, the diet and drink have been left unrestricted. Occasionally, however, it became necessary to taboo some article, lest its coming in contact with the remedy might prove most destructive; in other words, articles are occasionally forbidden when the mind seems to be inclined to lose sight of what must be made the all-important subject of thought by night and day. The wonderful improvement in this man's state was frequently commented on by both officers and men, who, of course, were, and still are, as little acquainted with the means employed as the patient himself was.

"It may be said this case, as here given, goes for nothing, in so far as it does not show that the pains were anything but casual; in which case any other mode of treatment, or very likely no mode at all, would have been equally successful; or it may be, again, as it has before been said, that it was altogether feigned, and that the commanding officer would have made a better and quicker cure. I think not; and for the following reasons: the man's flesh had wasted; his eye became sunken; his skin sickly in hue, as well as in feeling; his sleep, when he had any, was of the most disturbed character. But, more than all, the pain after some weeks returned, and the other bad symptoms followed in its wake; *yet both it and they were again relieved a second time by the same means.* While suffering from a third attack, he was sent to the Royal Naval Hospital at Malta, and then, after much suffering, he brought up by vomiting a portion of the mucous membrane of one of the small intestines, distinctly marked by two, at least, of the valvulæ conniventes. I am assured by one of the officers of the establishment that he most carefully examined this ejected matter, and that its characters were so marked that there could be no room for a doubt as to what it was. This being so, we have pretty clear proof that disease existed long before this slough was thrown off; and that even this organic disease was suspended, on two occasions, by mental influence only."

Sir John Forbes concluded his celebrated article on "Young Physic" in the 'British and Foreign Medical Review' (January, 1846), with a dozen suggestions for medical practice, one of which was "To encourage the administration of simple, feeble, or *altogether powerless*, non-perturbing medicines, in all cases in which drugs are prescribed *pro formâ, for the satisfacion of the patient's mind*, and not with the view of producing any direct remedial effect." Whether his advice has been adopted to the extent which it deserves, may well be doubted. Nothing can justify asserting what is not true in order to gain the patient's confidence—a course adopted in some of the foregoing cases—but this forms no essential part of the method of treatment now referred to. At the same time it is liable to degeneration into it. See observations at p. 88 of this work.

SECTION IV.—Systematic Direction of the Attention to a particular region of the Body.

The Attention may be definitely directed to the region affected, accompanied by the expectation of a certain result, without the administration of inert drugs.

Dr. Carpenter gives several cases which well illustrate this method. A gentleman, somewhat hypochondriacal, required a daily aperient, being costive from sedentary pursuits. When medicine lost its effect, he applied to a medical man for advice, who, seating his patient before him, with the abdomen uncovered, requested him to direct his attention exclusively to the sensations he experienced in that region, acting upon his Expectation, by assuring him that the desired action of the bowels would be secured, and pointing with his finger along the course of the arch of the colon and small intestines, so that his current of thought might pursue that direction. The experiment very shortly succeeded, "and for some time after, the bowels continued to act freely without medicine." It may be added in illustration of the same principle, though the case was not therapeutic in its character, that a lecturer was put to great inconvenience on one occasion by the threatened action of the bowels during the lecture. His Will triumphed; but ever afterwards he was troubled in the same way when he went to the same lecture-room, whatever precaution he might take, but not when he lectured elsewhere (viii, p. 953).

Although it is well known that powerful emotions act strongly upon the uterine functions, it is not so well understood how marked an influence an ideational faculty, in the form of concentrated Attention, exerts over them. A striking case is reported by Mr. Braid, which illustrates this fact very clearly. The effect took place, moreover, in a state of the system *not* rendered susceptible at the time by his special method. He had on previous occasions relieved a state of amenorrhœa by a mixed method, partly hypnotic and partly mental, but it then occurred to him that, inasmuch as he attributed his success in her case entirely to fixed mental Attention with a predominant idea (and faith in the result), he might succeed by the psychical

process alone, *without sending her to sleep*—wide-awake, in fact. He tried the experiment, addressing her thus—"Now, keep your mind firmly fixed on what you know should happen." In the meanwhile he allowed his own will to be passive, and read a book. At the expiration of eleven minutes the experiment ended, and the desired result took place within that period. The same treatment was adopted when required on subsequent occasions, and with the same success, with one exception, on which it is not less interesting to remark that the failure was due to her inability to fix her attention, "from having been put out of the way just before she came" to Mr. Braid, and not expecting that the operation (if it may be called so) would succeed. To fix her attention thoroughly, therefore, it became necessary to hypnotise her, and then the function was restored (xxiii, p. 95-6). This case shows the value of Attention, pure and simple, but the greater power of the more complete psycho-physical method about to be described (Section VI).

SECTION V.—Combined Influence of arousing certain Mental States, and lightly touching the affected part.

The same mental states may be more or less strongly called into action, assisted by a direct physical action upon the part. This is what occurs in the employment of the tractors, a very allowable mode of treatment, when the true principle at work is recognised. The Attention is first directed to the seat of disease, and is then conveyed from it, under the impression that the pain or other morbid sensation will concurrently pass away, and escape at the extremity of the limb or organ affected. Faith is no doubt a very useful adjuvant, but it does not appear to be essential; as in many instances the operator makes no appeal whatever to this principle, and the patient does not anticipate benefit from the treatment. Lastly, there is the local traction, an unquestionable influence, although merely wooden tractors are employed, and one which has been too much overlooked by those who attribute the success attending tractorism *entirely* to mental agency. It is difficult to separate these complex influences, but it is clear that the simple passing

of a substance, whether it be a wooden point or a finger, over the surface of a sensitive part of the body, must in itself exert a considerable influence over its capillary circulation, apart from its action in fixing the Attention.

I have before me a large number of cases of the successful treatment of disease by tractors, both metallic and wooden; but shall only select a few, in order to show their effect. It is sufficient to maintain, for the present purpose, that part of the result was due to mental influence.

At the time when the metallic tractors of Perkins excited so much attention, and their efficacy was attributed to galvanism, Drs. Haygarth and Falconer, of Bath, selected certain patients in the General Hospital for their experiments, employing two wooden tractors of nearly the same shape as those used by Perkins, and painted so as to resemble them in colour.

The cases chosen were those of chronic rheumatism—in the ankle, knee, wrist, and hip. One attributed his pain to gout. With the exception of the hip case, the joints were swollen, and all had been ill for several months.

"Of five patients, all except one assured us that their pains were relieved, and three of them that they were much benefited by the first application of the remedy. One felt his knees warmer, and he could walk much better, as he showed us with great satisfaction. One was easier for nine hours, till he went to bed, when the pain returned. One had a tingling sensation for two hours. The wooden tractors were drawn over the skin so as to touch it in the slightest manner. Such is the wonderful force of the Imagination. [This requires some modification.]

"Next day, January 8th, the true metallic tractors of Mr. Perkins were employed exactly in like manner, and with similar effects. All the patients were in some measure, but not more, relieved by the second application, except one, who received no benefit from the former operation, and who was not a proper subject for the experiment, having no existing pain, but only stiffness of her ankle. They felt (as they fancied) warmth, but in no degree greater than on the former day" (lxxxiii, p. 3).

Dr. H. adds, "If any person would perform these experiments, they should be performed in due solemnity. During the process, the wonderful cures which this remedy is said to have

performed, ought to be particularly related. Without these indispensable aids, other trials will not prove as successful as those which are above reported. [This is by no means certain.] The whole effect undoubtedly depends upon the impression which can be made upon the patient's Imagination."

Mr. Richard Smith, of the Bristol Infirmary, pursued the experiments commenced by Dr. Haygarth, and with the following results:—

"Robert Thomas, æt. 43. He had for some time been under the care of Dr. Savill, in the Bristol Infirmary, with a rheumatic affection of the shoulder, which rendered his arm perfectly useless.

"April 19th.—Having everything in readiness, I passed through the ward, and (in a way that he might suspect nothing) questioned him respecting his complaint. I then told him that I had an instrument in my pocket, which had been very serviceable to many in his state; and when I explained to him how simple it was, he consented to undergo the operation. In six minutes no other effect was produced than a warmth upon the skin, and I feared that this *coup d'essai* had failed. The next day, however, he told me that 'he had received so much benefit, that it had enabled him to lift his hand from his knee, which he had in vain several times attempted on the Monday evening, as the whole ward witnessed.' [The tractors used being made of lead, Mr. Smith thought it better to substitute for the future two wooden ones.] Mr. Burton held in his hand a stop-watch, whilst Mr. Lax minuted the effects produced. In four minutes the man raised his hand several inches, and he had lost also the pain in his shoulder, usually experienced when attempting to lift anything. He continued to undergo the operation daily, and with progressive good effect; for on the 25th he could touch the mantel-piece.

"On the 27th two common iron nails, disguised with sealing wax, were substituted for the pieces of mahogany before used. In three minutes he felt something moving from his arm to his hand, and soon after, he touched the Board of Rules which hung a foot above the fireplace. This patient at length so far recovered that he could carry coals, &c., and use his arm sufficiently to assist the nurse; yet, previous to the use of the

spurious tractors, he could no more lift his hand from his knee, than if a hundredweight were upon it, or a nail driven through it, as he declared in the presence of several gentlemen. The fame of this case brought applications in abundance.

"Thomas Ellis, a negro, from a chronic rheumatism in his upper and lower extremities, had been incapable of walking without support, or feeding himself, for four months. He came under my care on the 19th of April. At first the tractors produced no effect upon his thighs, and but little upon his arms. In the course of a few applications, however, he began to move his limbs better, and his nights were not so restless. In the course of this case, the nails, lead, and wood were used alternately; but there did not appear to be the least difference in the result.

"My patients crowded in upon me so fast that I had not leisure to bestow more than four or five minutes upon each; yet such effects were produced as were almost incredible. It usually happened that the skin was soon warmer, and occasionally darting pains were produced, which sometimes were troublesome long after the operation, and at others were of shorter duration. He complained also that the cicatrix of an old scald upon his arm smarted a great deal. He now began to mend so fast that he could comb his hair very readily, and on the 29th he put on his jacket and walked across the ward without a stick or the least assistance.

"John Peacock, a patient of Dr. New, had been affected for four months with a weakness of the hip, and severe rheumatic pains, brought on by working in a damp coalpit. At first the tractors occasioned considerable pain, and very restless nights (I use his own words), but after a few trials he began to sleep unusually well, and had fewer attacks of pain, and appeared confident and happy in the idea that a remedy had been discovered for his complaints.

"With such a subject, the event may be easily anticipated. This morning he came to thank me for my services, and he was always exceedingly grateful to Mr. Barton and Mr. Gainsford, who operated upon him in my absence. I cannot help mentioning one circumstance respecting this man. He came to me one day complaining of a violent settled pain in his forehead,

which he said almost distracted him, and requested me to draw it out. The pieces of mahogany were drawn gently over his forehead for a minute and a half, when the throbbing began to abate, and in two minutes had nearly ceased. In about three or four minutes the man arose from the chair, saying "God bless you, sir, now I am quite easy." He was attacked with this pain only once afterwards, which affected his vision considerably, but it was removed as easily as in the former instance.

"All these cases turned out so happily, it may be imagined that they are *selected*. I declare, however, that they are the first that occur in the Minute Book; and if I could imagine it necessary to add more, there are several remaining equally successful." Dr. Haygarth gives the following:—

"Benjamin Quarman, who had received but little benefit from medicine, was obliged for some time to hobble upon crutches with much difficulty and in great pain. He attributed his illness to a violent cold, caught by working in the mud on a pair of dock-gates. I must add, however, that he had been all his life a plumber, which contributes perhaps not a little to his indisposition. Upon the first application of the tractors (which were formed from a piece of bone) to his thigh, he experienced a pricking sensation; in a few minutes he could hardly persuade himself that they did not cut him; at the end of the operation he could use his limbs more freely, but complained that I had driven the pain into his knee. He was under the care of Dr. Moncrieffe, who was present when Mr. Lax relieved him, in a few minutes, of a pain which had been for some time fixed in the shoulder-blade. This man recovered considerably the use of his lower extremities, and was able to comb his hair easily, which the stiffness and pain in his shoulder had heretofore prevented him from doing" (op. cit.).

Dr. Alderson adopted the same course of treatment in the Infirmary at Hull, with what result will be seen in the following case, which is taken from the same work:—

"Robert Wood, æt. 67, on June 4th, was operated upon with (wooden) tractors for a rheumatic affection of the hip, which he has had for these eight months. During the application of the tractors, which was continued for seven minutes, no

effects were produced, except a profuse perspiration, and a general tremor. On ceasing the application of the tractors, to his inexpressible joy, and our satisfaction, the good effects of our labour were now produced and acknowledged; for he voluntarily assured us that he could walk with perfect ease, that he had the entire motion of the joint, and that he was free from pain. To use his own words, 'As to the pain I have now, I do not care if I have it all my life; that will matter nothing; you may take your medicines, I'll have no more of them.' And prior to his leaving the Infirmary he remarked how very warm those parts were where the tractors had been applied, and then walked from the Infirmary to his own house, assuring his companion that he could very well walk to Beverley.

"June 5.—Walked to the Infirmary this morning with very trifling difficulty; was so much pleased with the relief or rather cure obtained yesterday, that to use his own words again, he had very joyfully spread abroad the intelligence to his acquaintance. Has had some return of pain this morning, which, however, was removed by another application, and when asked how he felt, declared 'as bonny as augh,' and then marched off with a countenance expressive of his gratitude for the wonderful relief he had obtained" (op. cit.).

With such evidence as the foregoing of the advantage arising from the employment of wooden tractors, we may safely take the alleged success attending the use of metallic tractors as a fact, and only demur to the mode in which it is explained. The reader will find in the Autobiography of the late Mr. John Vine Hall (1865) many remarkable cases recorded to prove the efficacy of tractorism. Even were his veracity not as unimpeachable as it is, there would be no reason for disputing the facts. For instance, take the two following cases:

"Miss D—, of Hunton, met with an accident six years ago by a fall, which deprived her of the use of both her hands, so that she could not shut either; her knuckles were also much swollen and hard. She had been electrified several times, and had been under medical treatment several years without obtaining relief. She came to my house this morning, and on perceiving the state of her hands I prevailed on her to allow a trial of the tractors. The swelling and stiffness of the knuckles

were reduced in ten minutes, and having applied the tractors twenty-six minutes to each hand she could open and shut them with perfect ease, pressing her fingers firmly upon the fleshy part of her hand" (p. 171).

"*Contraction of the hand from gout.*—Mr. W. R—, of Maidstone, had long been afflicted with very severe attacks of gout, which frequently disabled him in his hands and feet. About four months ago his hand became so much contracted that he has not been able to close it to the present time, and the attempt to do so occasioned severe pain in the back of the hand, the skin being tense and hard. At his particular request I applied the tractors, drawing them across the back of his hand, which produced a sensation of great warmth; he then endeavoured to close his hand which occasioned exquisite pain, and he was compelled to desist. I continued drawing the tractors over those parts where the pain was greatest, varying the application from the back of the knuckles to the end of the fingers. The skin on the back of the hand at length became soft, and in twenty minutes from the commencement of the operation, he could open and shut his hand firmly without producing the least pain, except on the knuckle of the first finger. I then applied the tractors a few minutes to this part and the pain entirely subsided" (p. 154).

It is to be regretted that in the following case of lock-jaw so few particulars are given to enable us to judge fairly of its true nature:

"Mrs. P—, a poor woman in Wharf Lane, Maidstone, was seized with locked-jaw four days ago, and continued in a most deplorable state, attended by a physician and a surgeon till this morning, when she was completely cured in fifty minutes by the application of the tractors. The medical gentlemen had been exerting themselves to the utmost, in the kindest manner, and one of them said he would give a hundred guineas if he could save her life. This gentleman came into the room whilst I was in the act of using the tractors, which he had never seen before, but kindly said they should certainly have a fair chance, and he directed me where to apply them with the greatest advantage. I continued the operation for forty minutes without any apparent benefit, and then giving the tractors into

the hands of the surgeon, returned to my own house awaiting the issue of their further application. In about twelve minutes the surgeon (Mr. S—) came breathless with haste and delight to inform me that he had himself continued the use of the tractors, only ten minutes, when the poor creature opened her mouth. Mr. S— was so fully satisfied of the efficacy of the tractors that he immediately purchased a pair for his own use. Mr. S— writes, 'the case is yours, the suggestion was yours; I merely continued the employment of the measure from the apparent hopelessness of medical means in relieving the distressing complaint. Although previously to the employment of the tractors, I had utterly given up the idea of saving my poor patient; although I feared medicine would prove wholly inefficacious, yet I am not prepared to say that certain death would have been the result; but I do not for a moment mean to impeach the effect of the tractors in this case. I feel conviction that they produced the cure' " (p. 162).

With regard to the experiments made by Dr. Haygarth and others with wooden tractors, it can hardly fail to surprise the reader that these observers were content to stop, when they had proved that these instruments were as potent as if metallic. They had relieved their patients by *something*, sooner than they would otherwise have been relieved; and yet it never seemed to occur to them to continue the practice. They called this something "Imagination," and thought *that* was quite sufficient to dispose of the whole subject. This is, at least, as astonishing as that the public should believe in, and allow themselves to be cured by, the metallic tractors of Perkins, and be content to refer the influence to galvanism. If, therefore, any medical reader should be disposed to say that there is no use in recurring to the exploded method of tractorism, I would simply ask whether in his practice he turns *the same principle* to account in any other form? If not, he obviously fails to employ what the Bath Hospital doctors proved to be a very potent remedy.

SECTION VI.—Effect of exciting certain Mental States (I) under conditions in which an influence may pass as alleged from A to B (ANIMAL MAGNETISM or MESMERISM); (II) under conditions in which the operation of this Influence is precluded, or is not alleged by the defenders of Animal Magnetism to affect the results (BRAIDISM).

I. MESMERISM.

If the true explanation of the *modus operandi* of Mesmerism* is to be found in Animal Magnetism, it is clear that it does not properly fall under our consideration. If cures of disease

* The early stage of the mesmeric state, so well described by Agassiz in his own person, would probably be allowed by mesmerists themselves to be capable of induction by psycho-physical means alone. This description is so interesting that I append it:—"Neufchatel, Feb. 22nd, 1839. Desirous to know what to think of Mesmerism, I for long sought for an opportunity of making some experiments in regard to it upon myself, so as to avoid the doubts which might arise on the nature of the sensations which we have heard described by mesmerised persons. M. Desor and Mr. Townshend (Rev. Chauncy Hare Towshend, A.M.) arrived here with the 'Evening Courier,' and at 10 p.m. Mr. Townshend commenced operating on me. While we sat opposite to one another, he, in the first place, only took hold of my hands and looked at me fixedly. I was firmly resolved to arrive at a knowledge of the truth, whatever it might be; and, therefore, the moment I saw him endeavour to exert an action upon me, I silently addressed the Author of all things, beseeching him to give me power *to resist the influence*, and to be conscientious in regard to myself as well as in regard to the fact.

I then fixed my eyes upon Mr. Townshend, attentive to whatever passed. I was in very suitable circumstances; the hour being early, and one in which I was in the habit of studying, was far from disposing me to sleep. I was sufficiently master of myself to experience no emotion, and to repress all flights of imagination, even if I had been less calm; accordingly, it was a long time before I felt any effect from the presence of Mr. Townshend opposite me. However, after at least a quarter of an hour, I felt a sensation of a current through all my limbs, and from that moment my eyelids grew heavier. I then saw Mr. Townshend extend his hands before my eyes, as if he were about to plunge his fingers into them; and then made different circular movements around my eyes, which caused my eyelids to become still heavier. I had the idea that he was endeavouring to make me close my eyes, and yet it was not as if some one had threatened my eyes, and in the waking state, I had closed them to *prevent* him; it was an irresistible heaviness of the lids which compelled me to shut them; and by degrees I found I had no longer the power of keeping them open, but did not the less retain my consciousness of what was going on around me, so that I heard M. Desor speak to Mr. Townshend, understood what they said, and heard what questions they asked me, just as if I had been awake, but I had not the power of answering. I endea-

are performed by a magnetic influence passing from A to B, they are not (as has already been intimated) illustrations of the influence of A's Mind upon A's Body; the phenomena with which alone we are now concerned. If I assume (as most

voured, in vain, several times to do so, and when I succeeded, I perceived that I was passing out of the state of torpor in which I had been, and which was rather agreeable than painful.

In this state I heard the watchman cry ten o'clock; then I heard it strike a quarter past; but afterwards I fell into a deeper sleep, although I never entirely lost my consciousness. It appeared to me that Mr. Townshend was endeavouring to put me into a sound sleep; my movements seemed under his control, for I wished several times to change the position of my arms, but had not sufficient power to do it, or even really to will it; while I felt my head carried to the right or left shoulder, and backwards or forwards, without wishing it, and, indeed, in spite of the resistance which I endeavoured to oppose; and this happened several times.

I experienced at the same time a feeling of great pleasure in giving way to the attraction which dragged me sometimes to one side, sometimes to the other, then a kind of surprise on feeling my head fall into Mr. Townshend's hand, who appeared to me for the first time to be the centre of attraction. To his inquiry if I were well, and what I felt, I found I could not answer, but I smiled; I felt that my features expanded in spite of my resistance; I was inwardly confused at experiencing pleasure from an influence which was mysterious to me. From this moment I wished to wake, and was less at my ease, and yet, on Mr. Townshend asking me whether I wished to be awakened, I made a hesitating movement with my shoulders. Mr. Townshend then repeated some frictions, which increased my sleep; yet I was always conscious of what was passing around me. He then asked me if I wished to become lucid, at the same time continuing, as I felt, the frictions from the face to the arms. I then experienced an indescribable sensation of delight, and for an instant saw before me rays of dazzling light which instantly disappeared. I was then inwardly sorrowful at this state being prolonged; it appeared to me that enough had been done with me; I wished to awake, but could not. Yet when Mr. Townshend and M. Desor spoke I heard them. I also heard the clock, and the watchman cry, but I did not know what hour he cried. Mr. Townshend then presented his watch to me, and asked if I could see the time, and if I could see him, but I could distinguish nothing; I heard the clock strike the quarter, but could not get out of my sleepy state. Mr. Townshend then woke me with some rapid transverse movements from the middle of the face outwards, which instantly caused my eyes to open, and at the same time I got up, saying to him, "I thank you." It was a quarter past eleven (about an hour having elapsed since I passed into the mesmeric state). He then told me, and M. Desor repeated the same thing, that the only fact which had satisfied them that I was in a state of mesmeric sleep, was the facility with which my head followed all the movements of his hand, although he did not touch me, and the pleasure which I appeared to feel at the moment when, after several repetitions of friction, he thus moved my head at pleasure in all directions."—AGASSIZ (lxxxviii, p. 388).

medical men would), that no such influence exists, and use the cases which Mesmerists have published, as examples of a merely psycho-physical power, I shall be charged by them with not excluding a possible source of error. On the other hand, by rejecting these cases I lose a mass of evidence which otherwise forcibly supports the influence of mental states upon bodily disease. If, with Dr. Carpenter, I were to refer, in this chapter, all the phenomena induced by mesmerists, to the monotony of sensory impressions and Expectation, I might easily fill it with successful and highly important cures performed through the influence of the Mind upon the Body.* And if I do not pursue this course here, I may, at any rate, ask those who do not for a moment doubt that they belong to the same class of facts as those detailed under Braidism, to give them that attention which they surely deserve from this point of view, no less than if they were due to magnetism, and to make use of them under some form of psycho-therapeutics, whether it be through the Imagination, Attention, or Faith. The observations on this subject of Dugald Stewart, an impartial observer of the discussion carried forward in his day with so much acrimony, are so excellent that they will bear repeating here.

"It appears to me," he says, "that the general conclusions established by Mesmer's practice, with respect to the physical effects of the principle of Imagination (more particularly in cases where they co-operated together), are incomparably more curious than if he had actually demonstrated the existence of his boasted science; nor can I see any good reason why a physician, who admits the efficacy of the *moral* agents employed by Mesmer, should in the exercise of his profession scruple to copy whatever processes are necessary for subjecting them to his command, any more than that he should hesitate employing a new physical agent, such as electricity or galvanism" (xi, III, p. 221).

* My own view is that Mesmerism should be practised under the name of hypnotism or Braidism to prevent a confusion of ideas as to its real nature; but full credit should be given to those who performed mesmeric cures long before Mr. Braid's time. Better, however, cure disease under a name which is associated with an unproved theory, than refuse on that account to employ it.

Assuming that the first French Commission on Animal Magnetism (1784) were correct in regarding the phenomena as fairly referable to Imagination and Imitation, we must agree with them that they constitute the groundwork of a NEW SCIENCE—that of the Moral over the Physical, or as they again express themselves, "the power which man has over the Imagination may now be reduced to Art and practised methodically."

Let us take, for instance, the relief of disease afforded by a highly respectable surgeon, and attributed by him to Mesmerism. It is a case of hemiplegia, and is thus reported by the late Mr. Tubbs, of Upwell, Cambridgeshire. Those who knew this gentleman will not call in question his veracity, however much they may differ from his theory.

"Edward Wine, æt. 75, had been paralysed *two years* in one arm and leg. The left arm was spasmodically fixed to the chest, the fingers drawn towards the palm of the hand and wasted, quite incapable of holding anything; the lower lip was drawn a little down, and could not hold the saliva, which dropped out at the side of his mouth; when walking would draw the left leg after him. His gait was tottering, and for two years he was never known to walk without a stick. Was locally mesmerised, May 21st. In forty minutes he felt me draw a pain from his shoulder to his fingers' ends. After the pain was gone he felt as if he could flex and extend the arm, and he accordingly did. By the next operation he managed to hold a spatula in his hand, and exclaimed that he should now be able to eat all the victuals from his old lady. He was able to walk up a staircase into my photographic department, where I took his likeness while he was mesmerised by M. Disnay. He was mesmerised twice a day, and always felt more power in the arm and leg. Last Sunday, I stuck a nosegay in his coat and posted him off to church, and he tells me he walked like a gentleman down the aisle, carrying his stick in his lame arm. There being a disposition in his fingers to contract, I have made him wear a splint. I ought not to omit an important feature in his case; his incontinence of urine is nearly cured" (xxxvi, April, 1855).

My friend Dr. Procter, of York, attended some years ago a chemist of that city for, he states, "an affection of the bladder

and kidneys, accompanied by considerable diuresis, and during sleep there was involuntary discharge of urine that rendered his situation most distressing." Dr. Procter adds, "All the usual plans of treatment were had recourse to, and the opinion of one of our eminent physicians taken, without any benefit resulting therefrom." The patient was recommended to try Mesmerism, and did so. Dr. Procter says, "the effect was certainly wonderful; the involuntary discharge of urine ceased at once, and the quantity became considerably diminished; and though certainly his general condition was not materially benefited, the removal of the previously-mentioned symptom, rendered his life comparatively comfortable, and greatly diminished his sufferings" (xxxvi, 1851). In this case no mesmeric coma was induced, but the usual passes were made, and even on the first occasion produced a state of control over the bladder which had not existed for twelve months. The patient said afterwards that he was opposed to the trial of this process and expected no result; "therefore," he says, "it could not be the effect of Imagination." But although it was not the result of expectant Imagination, it does not follow it was the effect of any other influence than that of his own mind (*e.g.* Attention) upon his body. Confusion of ideas as to this distinction is exceedingly common. If "passes" assist the direction of the Attention, by all means let them be used. Dr. Elliotson said with great force, in regard to the removal of "ganglions" by mesmeric passes, without friction, "Mr. Braid, Dr. Carpenter, and Dr. Holland, must ascribe these cures to dominant ideas, suggestion, and expectant attention, and ought to petition for the introduction of these into the next 'Pharmacopœia' of the Royal College of Physicians." We do make this petition; at any rate, let these psychical agents be included in the *Armamenta Medica* of every medical man. I have already shown (p. 353) that Dr. Elliotson admitted that *some* of the effects of Mesmerism might equally well be attributed to the simple action of mental states upon the body, and I am not sure that he would have wholly denied the *possibility* of the relief afforded, in the foregoing cases, being due to the influence of the Attention and other mental states, assisted by local manipulation. If it be so, it would not be unfair to class these and similar

cases of relief or cure, under the next division—that of Braidism. All, however, we urge here is this, that so far as such cases may be fairly and sufficiently explained by the influencing principles which form the subject of the present volume, they may be employed to prove the great importance of utilising these principles in practice. Of course, even if shown to be due to a magnetic fluid, it is none the less the duty of medical men to use the mesmeric method, but it forms from this stand-point no part of our own programme. We may, however, employ it if found to be beneficial, and until convinced to the contrary, attribute its success to the operation of any mental state which we honestly believe, from the effects produced in those cases in which extraneous agencies are excluded, to be sufficient to explain the result.

Deleuze records a case which should be read in connection with one reported by Mr. Braid in the next section, which is very similar. Here it would be reasonable to conclude that the mesmeric cure depended for its success on the same principle as that which obtained in the hypnotic process; and if so, animal magnetism is excluded. Deleuze says, "Opacities in the cornea of the eye have been frequently made to disappear. I am acquainted with a woman whom this disorder, produced by small-pox, had deprived of the use of one eye, and who recovered it while being magnetised for another disease." He adds that Dr. Geritz was consulted about a girl, eight or nine years of age, "who, from the same disease, had one eye entirely covered with a film so thick that she could not see the light. He judged, as did all the physicians who had been consulted, that the disease being incurable by ordinary means, it was useless to administer remedies; but the child having inspired him with much interest, he resolved to undertake her treatment with magnetism. During two months the action appeared absolutely powerless; the third month the film grew thinner, and in the succeeding one the cure was complete" (lxxxvii, p. 146).

II. Braidism.

If the influence of Mind upon Body can be utilised so as to throw the system into a state in which this influence is inten-

sified, then it is reasonable to hope that psycho-therape will be especially likely to prove beneficial. Now this is Braidism or Hypnotism, whether it induces sleep or effects. The physical strain to which the eyes are subj may have some influence in exhausting the cerebral force g rally or partially through the third pair, and may so allow c action of the sympathetic upon certain regions of the enceph thus suspending the functions of some parts and rend others more acutely impressible; but the mental strain inv in Attention, has also much to do in producing this result. this aspect of the subject, the reader is referred to p. 9 o work. Here we shall give a few proofs of the successful re of this mode of treating disease in the hands of Mr. B which, in many instances, combines psychical and phy elements of treatment, the former, however, being the interesting and important part of the system. "Whe consider," says Mr. Braid, "that in this process we acquired the power of raising sensibility to the most e ordinary degree, and also of depressing it far below the to of natural sleep; and that from the latter condition, any o of the senses may be raised to the exalted state of sensib referred to, almost with the rapidity of thought, by so si an agency as a puff of air directed against the respective pa and that we can also raise and depress the force and frequ of the circulation, locally or generally, in a most extraordi degree, *it must be evident we have thus an important pow act with* [*in the cure of disease*]. Whether these extraordi physical effects are produced through the Imagination chie or by other means, it appears to me quite certain *that Imagination has never been so much under our control capable of being made to act in the same beneficial and uni manner, by any other mode of management hitherto kno* (vi, p. 5).

To the foregoing should be added Mr. Braid's own defini

* Mr. Braid did not induce unconsciousness in more than one in ten case

† Mr. Braid gives proof that, independently of the imagination, the phenc are produced by the fixation of the mind and eyes, and general repose o patient.

Hypnotism, "a peculiar condition of the nervous system, uced by a fixed and abstracted attention of the mental and ual eye, on one object, not of an exciting nature;" and his process of inducing it; viz., "Take any bright object ween the thumb and fore and middle fingers of the left hand; l it from about eight to fifteen inches from the eyes, at such istance above the forehead as may be necessary to produce greatest possible strain upon the eyes and eyelids, and ble the patient to maintain a steady fixed stare at the ect. The patient must be made to understand that he is to p the eyes steadily fixed on the object, and the mind riveted the idea of that one object. . . . After ten or fifteen nds have elapsed, by gently elevating the arms and legs, it be found that the patient has a disposition to retain them the situation in which they have been placed, *if he is nsely affected.* If this is not the case, in a soft tone of e desire him to retain the limbs in the extended position, thus the pulse will speedily become greatly accelerated, and limbs in process of time will become quite rigid and in- ntarily fixed. It will also be found that all the organs of cial sense, excepting sight, including heat and cold, and scular motion or resistance, and certain mental faculties, *at first,* prodigiously *exalted,* such as happens with regard the primary effects of opium, wine, and spirits. After a tain point, however, this exaltation of function is followed a state of depression, far greater than the torpor of *natural* p. From this state of the most profound torpor of the ans of special sense, and tonic rigidity of the muscles, they y, at this stage, *instantly* be restored to the *opposite* condi- n of extreme mobility and exalted sensibility, by directing a rent of air against the organ or organs we wish to excite to ion, or the muscles we wish to render limber, and which had n in the cataleptiform state" (p. 30).

Of the numerous cases published by Mr. Braid it is difficult know which to select; they all so forcibly illustrate the cess of his method. In the following case, condensed from report, the sight was affected:—

In June, 1854, Miss R— consulted Mr. Braid. A year ore she had an attack of ophthalmia, which yielded so far

to treatment that she got out of doors in a month. Then a pole fell on the upper and left side of the head, two or three days after which she suffered severe pain, and suddenly became quite blind on that side, with dilated pupil. After four months' medical treatment, sight was partially restored. In January, 1854, while reading, she suddenly lost the sight of the other eye, accompanied with dilated pupil. A few days after, she struck the same part of the head as before against the mantel-shelf, which was followed by loss of sight of the left eye. She was now led about in a state of total blindness, and was sent to Dublin to be under Mr. Wilde, under whose care she remained six weeks and derived decided improvement, for the iris had become somewhat sensitive to light, and she was able to discern large objects, but could neither see to read nor write. She now returned home, but the improvement in spite of treatment being stationary, her medical attendant recommended her to try hypnotism under Mr. Braid. He found no apparent physical imperfection to account for impaired vision, nor was there any pain about the head or eyes "which had very much the appearance of an incipient case of amaurosis, only the pupils were not quite so much dilated." She could not discern a single letter of the title-page of a book, although some were a quarter of an inch long. "Having hypnotised the patient and directed the nervous force to the eyes, by wafting over them, and gently touching them occasionally so as to keep up a sustained act of attention of the patient's mind to her eyes and the function of vision, she was aroused in about ten minutes. I now presented before her the title-page of the same book, when she instantly exclaimed, with delight and surprise, 'I see the word commerce!' pointing to it. I told her she would see more than that presently; and in a little while she exclaimed, 'I see commercial,' then 'I see dictionary;' and shortly after, 'I see McCulloch,' but she could see nothing more. I told her that after a little rest, I felt assured, she would see still smaller print; and after a few minutes, she was able to read 'London, Longman, Green & Longmans.' Such was the result of my first process. After a second hypnotic operation, next day, the patient could read, when first aroused, the whole of a title-page of a pamphlet; and in about five

minutes after, she read two lines of the text. After another operation, the same day, she could read the small close print in the appendix; and was able the same evening to write a letter home reporting progress, for the first time for twelve months. She only required two more hypnotic operations, when she was found able to read the smallest sized print in a newspaper; after which she left me, quite cured, and as I have heard, she has continued well ever since" (lxxxiv, p. 36). No medicine was given.

In another case, Mrs. Stowe, aged 44, who from weak sight had used spectacles twenty-two years, and could not, without them, distinguish the capital letters of advertisements in a newspaper, nor the large heading of the paper, was able to read both the large and small heading, and day, month, and date of the paper, after being hypnotised by Mr. Braid for eight minutes, and in returning home could read the sign-boards which she had not done for years before. Her sight continued to improve—she could thread her needle, No. 8, without spectacles—and Mr. Braid states "this patient has retained the improvement of her sight" (vi, p. 170).

One case reported by Mr. Braid is particularly interesting, because it proves the effect which may be produced when the affection is not in any degree "on the nerves," for actual opacity of the cornea was removed (compare p. 105 of this work). Mrs. S— had severe rheumatic fever in 1839, during the course of which the left eye became implicated, involving both its internal and external structures. When seen by Mr. Braid in 1842, the eye was free from pain, but was of no service. There was opacity over more than one half of the cornea, sufficient to prevent distinct perception of any object placed opposite the temporal half of the eye, all being seen through a dense haze, and objects placed towards the opposite side were seen very imperfectly, owing to the injury the choroid and retina had sustained in the points on which the images of such objects were reflected. The opacity was not only an obstacle to distinct vision, but was also a source of annoyance from its disfigurement, being obvious even to those at a considerable distance. She was a relation of Mr. Braid, and was in his house three months before he operated upon her, during which

time no change took place. Violent pain in the arm and shoulder induced her to submit to the hypnotic treatment, which proved successful; but what was more surprising and quite unlooked for by Mr. Braid, her *sight* was so much improved that she was able to see everything in the room, and to name different flowers, and distinguish their colours, whilst the right eye was shut, which she had not been able to do for more than three years and a half previously. The operation was continued daily, and in a very short time *the cornea became so transparent, that it required close inspection to observe any remains of the opacity*. After the first operation there was considerable smarting in the eye, which continued all night, and in a less degree, after future operations, which, no doubt, roused the absorbents and effected the removal of the opacity. Stimulating the optic nerve to greater activity, however, must have been the chief cause of the very rapid improvement, which enabled her to see objects after the second operation. Mr. Braid adds to the foregoing, that objects were seen from the temporal side of the eye much more distinctly than from the nasal side, owing to the irreparable damage the retina and choroid had sustained (vi, p. 175).

Mr. Braid was successful in exciting the sense of hearing in even the deaf and dumb. The following is one of the cases recorded:—

Nodan, deaf-mute, æt. 24, "was never considered to have the power of hearing, properly so-called, according to the opinion of the head-master of the Deaf and Dumb Institution (Mr. Vaughan), where he was a pupil; after the first operation (inducing hypnotism, then extending the limbs, and fanning the ears), I satisfied myself he had no sense of hearing; but after the second, which I carried still further, he could hear, and was so annoyed by the noise of the carts and carriages when going home, after that operation, that he could not be induced to call on me again for some time. He has been operated on only a few times, and has been so much improved, that although he lives in a back street he can now hear a band of music coming along the front street, and will go out to meet it. I lately tested him, and found he could hear in his room on the second floor a gentle knock on the bottom stair. His

improvement, therefore, has been both decided and permanent, and is entirely attributable to hypnotism, as no other means were adopted in his case" (vi, p. 182).

Mr. Braid's method was not only effective in cases of hysterical paralysis, but was certainly beneficial in those in which serious organic disease was present. Thus, "a gentleman, æt. 60, had a paralytic stroke two years and a half before consulting me, which deprived him entirely of the use of the right arm, and enfeebled the right side and leg. When he called on me, he walked very feebly, could scarcely close the fingers and thumb, and could not extend them fully. He could, with great difficulty, raise the hand as high as the pit of the stomach; the pupil of the right eye was considerably larger than the left, and not quite circular; speech very imperfect. After being hypnotised for five minutes he was able to open and close the hand freely, and to raise the hand above the head, and pass it to the back of the head, and he could also walk and speak much better. Pulse regular; before the operation, it was very irregular." Seven weeks after, Mr. Braid reports that the improvement was permanent. "He could speak and walk much better, could raise the arm and move the fingers and hand freely, could pass the hand above and over the head, and take off his hat with it. The right pupil was also quite circular now, and nearly the same size as the other" (vi, p. 215).

In another case, T. J—, æt. 36, had a paralytic seizure, which deprived him of feeling and motion of the left arm and hand. Nearly three months after, Mr. Braid saw him. He had partially recovered the use of his fingers, and could raise his arm nearly to the horizontal position, but just before he was seen by Mr. Braid he had had an accession of the paralytic symptoms, and the arm was spasmodically fixed to the side. After being four minutes hypnotised he could move the fingers, hand, and arm freely, elevating it above his head, and retaining it in any situation he was asked. The feeling, however, remained very imperfect. He was subsequently hypnotised, and in four days the feeling as well as power was restored. He remained well (p. 217).

The following instance of relief from rheumatism is important because there was no Faith, Expectation, or Imagination present

to cause it. The mental element was therefore confined to the Attention. Compare this with remarks at pp. 395-6.

"Mrs. P—, upwards of 50, had suffered so severely from rheumatism that she had not enjoyed a sound night's rest for seven months. External and internal means, which had been beneficial in a former similar attack, had been tried without effect before I was sent for to visit her. She was suffering excruciating pain in one leg, particularly above the knee-joint. When I proposed to relieve her by hypnotism she repudiated the idea, told me she had no faith in it, and felt assured in her own mind that such an operation could be of no use to her. I told her I cared little for her want of faith in the remedy, provided she would submit to be operated on as I should direct. She at last consented, and in the presence of her three daughters, was hypnotised. In eight minutes she was aroused, and was quite free from pain; wished to know what I had done to her; said she felt sure hypnotising her could not have relieved her. To this I replied by asking where her pain was felt now. She answered she felt no pain, but persisted she was sure I had done nothing to take it away. The manner in which she could walk and move her limbs, was sufficient proof the pain was gone, notwithstanding her scepticism about the agency. When I called next day I was informed by her family that *she had slept comfortably all night*, and had gone out, being quite well. Two days after I called again, and was informed by her that she had been overtaken in a shower, and had over-exerted herself on that occasion, and had had a return of the pain, although not so bad as at first. I hypnotised her again with complete relief, and she has never required a repetition of the operation since, so that she has now enjoyed a release from her old enemy for eleven months, in defiance of her scepticism" (vi, p. 235). This fact is most important.

We will only cite another case of rheumatism, that of a boy, æt. 12, who was suffering from a violent rheumatic affection of the legs, back, and chest, so that he required to be carried into Mr. Braid's house. After being hypnotised, he was so much relieved as to be able to walk about the room freely, and to walk to his cab without assistance. Next day he called and was hypnotised again, and left quite free from pain, and remained

so well as not to require another operation. This boy took no medicine, and had no external application (loc. cit.).

The influence of Braidism, when carried to the stage of "nervous sleep," must be regarded as among the secondary effects of psycho-physical agents. Sound and refreshing sleep in cases of insomnia is no insignificant blessing; and we have no doubt there may be instances in which to produce it by acting upon the mind, is more beneficial in the long-run than by employing even chloral or bromide of potassium. So, in regard to psychical anæsthesia, in view of the danger to life, which attends the employment of chloroform, &c., there may be cases in which it is safer, although it may be more tedious. See p. 35 of this work.

The foregoing cases constitute, in my opinion, a most practical answer to the questions with which we commenced the chapter; more practical, probably, than those which have been given under the other modes of treatment, which involve the action of Mind upon Body in the cure of disease. Braidism possesses this great advantage, that, while the Imagination, Faith, or Expectation of the patient may be beneficially appealed to, this is not essential; the mere concentration of the Attention having a remarkable influence, when skilfully directed, in exciting the action of some parts, and lowering that of others. The short period of time required, also, compares favorably with that consumed in some other forms of mental therapeutics. It is to be hoped that fresh interest will be awakened in this method of relieving pain, defective action of the nerves of special sense, and neuro-muscular affections, whether arising from excessive or defective action, and that a more general use will be made of it by those who (unlike the author) are engaged in the active practice of their profession.

Lord Bacon, with his wonderful range of vision, both physical and metaphysical, did not omit to hint at "the inquiry how to raise and fortify the Imagination; for," he adds, "if the Imagination fortified have power, *then it is material to know how to fortify and exalt it*" (xiv, I, p. 127). He enters a protest against charms, characters, and ceremonies, but observes that, in regard to "the operation of the conceits and passions of the Mind upon the Body, we see all wise physicians, in the prescrip-

tions of their regimens to their patients, do ever consider *accidentia animi* as of great force *to further* or *hinder* remedies, or recoveries." He says, "It is an inquiry of great depth and worth concerning Imagination, how, and how far it altereth the body proper of the imaginant." It does not follow, indeed, that, because "it hath a manifest power to hurt, it has the same degree of power to help. But the inquisition of this part is of great use, though it needeth, as Socrates said, 'a Delian diver,' being difficult and profound."

If for the word Imagination we substitute Mental States, may we not say that Mr. Braid has proved himself the Delian diver who Bacon hoped would arise?

Summary.—1. The influence of the Mind upon the Body, shown in Parts I, II, and III, to operate powerfully in health, is at least as powerful in disease, and may be highly beneficial in aiding the *vis medicatrix*, and opposing the *vis vitiatrix Naturæ*. Its action may be gradual; or sudden, as in the shock of a railway accident (see *Preface*).

2. This truth is by no means confined, as it is often supposed to be, to nervous disorders, but extends to other diseases.

3. The principle may be carried out, in a general way, by calming the mind when the body suffers from its excitement; by arousing the feelings of Joy, Hope, and Faith; by suggesting motives for exertion; by inducing regular mental work, especially composition; by giving the most favorable prognosis consistent with truth; by diverting the patient's thoughts from his malady; and thus, in these and other ways, influencing beneficially the functions of Organic Life through the Mind.

4. The influence of the Will upon disease, apart from voluntary Attention, is a very important agent in Psycho-therapeutics.

5. The effects accidentally produced upon the body by mental impressions, in disease, can be imitated, and the arts employed by the empiric (see *Preface*) can be divested of their non-essentials, and systematically utilised.

6. There are various methods by which this may be effected, and it is not necessary to adopt any one to the exclusion of the rest; but Braidism offers great advantages.

7. The great principle which appears to be involved in all, is the remarkable influence which the mind exerts upon any organ

or tissue to which the attention is directed, to the exclusion of other ideas, the mind gradually passing into a state in which, at the desire of the operator, portions of the nervous system can be exalted in a remarkable degree, and others proportionately depressed; and thus the vascularity, innervation, and function of an organ or tissue can be regulated and modified according to the locality and nature of the disorder.

8. The psychical element in the various methods comprised under psycho-therapeutics is greatly assisted by physical means, as gentle friction, pointing, passes, &c.;* and this in two ways; first, by more definitely directing the Attention to a part in which it is desired to set up healthy action; and, secondly, by locally exciting the vascular and nervous activity, or directing it into another channel. In Braidism the physical element is still further employed in straining the eyes, and so exhausting some portion of the brain.

9. Unconsciousness may or may not be induced; the relief and cure of disease following the processes adopted, when the patient remains conscious of what is going on. When there is sleep, its character resembles that of somnambulism and not ordinary sleep.

10. Potent as is the influence of mere Attention directed to a particular region of the body, it may be neutralised by a contrary Expectation, and intensified by Faith and a vivid Imagination.

* In his 'Nature and Art in the Cure of Disease,' Sir John Forbes (under the head of regimenal means desirable to adopt) includes "the sight of monotonous mesmeric passes, or fixed attention on an object, to produce mesmeric sleep or hypnotism; and (under the head of physical means) "mesmeric and hypnotic manipulations."

CHAPTER XVII.

CONCLUSION.

We have now completed our survey of Psycho-physical Phenomena; those resulting from the action of the Mind upon the functions of the Body, short of disease, and which may be classed under Psycho-physiology; those constituting morbid states and which should be included under Psycho-pathology; and lastly, those phenomena involving restorative processes, which justify the employment (in addition to physical remedies) of a reasonable Psychopathy, or Psycho-therapeutics—a preferable term in an age when the multiplication of *pathies* is undesirable.

Let us briefly glance at the broad principles and the most salient facts which have come under our notice in this investigation into Psycho-physical Phenomena.

We have seen that the influence of the Mind upon the Body is no transient power; that *in health* it may exalt the sensory functions, or suspend them altogether; excite the nervous system so as to cause the various forms of convulsive action of the voluntary muscles, or depress it so as to render them powerless; may stimulate or paralyse the muscles of organic life, and the processes of Nutrition and Secretion—causing even death; that *in disease* it may restore the functions which it takes away in health, re-innervating the sensory and motor nerves, exciting healthy vascularity and nervous power, and assisting the *vis medicatrix Naturæ* to throw off diseased action or absorb morbid deposits.

We have seen the importance of the automatic action of the Mind (or brain) upon the Body on the one hand, and of the Will on the other, the former occasioning a host of disorders of sen-

sation and motion, and the latter exerting great power over the system directly, and indirectly; directly, in controlling reflex action of the nervous centres whether encephalic or spinal; indirectly, acting on the mind itself, in disposing it to pass into such states as shall excite certain bodily functions, by virtue of those well-recognised psycho-physical laws which then come into operation.

We have also seen the far-reaching influence of that antagonism which appears to exist between the two great divisions of the nervous system in regard to vascularity. Upon this principle we have had again and again to fall back, in endeavouring to trace the mode in which so many striking physical phenomena succeed to varying mental states. The normal equilibrium which we witness between the cerebro-spinal and the sympathetic systems, as respects their influence upon the blood-vessels, is obviously more or less interfered with, when the mind or brain is unable to exercise its accustomed force, or when it transmits a more than wonted impulse; allowing the unrestrained action, or paralysing the influence of the sympathetic vaso-motor nerves. The general impression that the emotions act specially upon the sympathetic system is, on this hypothesis, only true in the sense that this system is liberated to act with excessive force, or prevented acting as in health, by the change wrought, in the first instance, in the organ of the mind. At the same time it is difficult to see any reason why there should not be a direct action upon the sympathetic centre or centres—as direct as occurs in galvanism.

The application of a similar principle, in regard to the functions of the cerebrum and the spinal cord, explains the unbalanced action of the latter when the former is temporarily paralysed by mental shock, and probably goes far to explain, without any further principle, the remarkable influence of the emotions in causing convulsive disorders.

In the course of this inquiry, I have, I trust, succeeded in one of the objects I had in view, that of elucidating the nature and action of what is usually understood as the Imagination.

I hope, in conclusion, that some positions open to attack have been made more secure by the evidence collected together in this work.

I think, for example, that the reader who has had the patience to accompany the author *ab ovo usque ad mala* will agree with him, that they are needlessly sceptical who, with a well-known physician, "doubt the instances of sudden change in the colour of the hair consequent on a powerful mental emotion, the evidence by which such instances are supported being questionable," or who with a metropolitan surgeon consider that "there is no proof that the blood is affected in its characters by any mental processes," and that those greatly err who believe, with an able writer on this subject, that "the Imagination is all-powerful, *except over disease*—the dominion of disease being exerted over Imagination itself."

Imperfect as the handling of this wide and important subject has been in its varied aspects, the author trusts that he has succeeded in placing upon a firm and rational basis the complex phenomena resulting from the Influence of the Mind upon the Body.

APPENDIX.

ANALYSIS OF THE PRINCIPAL ILLUSTRATIONS GIVEN IN THIS WORK.

I. THE INTELLECT.

Excess of Study or Mental Strain.

1. *Epilepsy.*
2. *Diabetes.*
3. *Do.*
4. *Do.*
5. *Do.*
6. *Nervous headache.*
7. *Hemiplegia.*
8. *Jaundice.*

Voluntary Attention and Contemplation.

1. *Visual hallucination.*
2. *Ocular spectra.*
3. *Visual illusion.*
4. *Sensation of great cold.*
5. *Sensation of heat.*
6. *Darting and pricking sensation.*
7. *Cataleptic rigidity.*
8. *Do.*
9. *Stigmata.*
10. *Purging.*
11. *Relief of amenorrhœa.*
12. *"Nervous sleep" or hypnotism.*

Involuntary Attention. Dominant Ideas.

1. *Ocular spectra after a dream.*
2. *Purging.*
3. *Palpitation.*
4. *Extravasation of blood on the chest (from a dream).*
5. *Ague.*
6. *Purging (after a dream).*
7. *Do.*
8. *Removal of warts.*
9. *Do.*

When hypnotised.

10. *Cure of partial blindness. Incipient amaurosis.*
11. *Relief of "weak sight."*
12. *Absorption of opacity of cornea.*
13. *Beneficial effect in deaf and dumb.*
14. *Relief in paralysis.*
15. *Do.*
16. *Cure of rheumatism.*
17. *Do.*

Recollection and Memory. Association of Ideas.

1. *Nausea.*
2. *Ocular spectra.*
3. *Epilepsy.*
4. *Paralysis.*
5. *Vomiting.*
6. *Purging and nausea.*

Imagination and Expectation.

1. *Visual hallucination.*
2. *Auditory hallucination.*
3. *Olfactory hallucination.*
4. *Visual illusion.*
5. *Do.*
6. *(When hypnotised) anæsthesia, sensation of great heat, perspiration, sensation of cold.*
7. *Muscular movements.*
8. *Epilepsy.*
9. *Nervous hydrophobia, chiefly dysphagia.*
10. *Speechlessness and ptosis.*
11. *Temporary paralysis (hyp.)*
12. *Syncope.*
13. *Death.*
14. *Death.*
15. *Do.*
16—95. *Vomiting.*
96. *Sweating.*
97. *Removal of warts.*
98. *Purging.*
99. *Do.*
100. *Do.*
101. *Relief of cramp of the stomach.*
102. *Relief of organic intestinal disease.*

Imitation and Sympathy.

1. *Acute pain.*
2. *Do.*
3. *Muscular movements.*
4. *Convulsions.*
5. *Spasmodic stricture of the œsophagus.*
6. *Inflammation of the axillary glands.*
7. *Uterine pains.*
8. *Extravasation of blood around the ankle.*
9. *Inflammation of lips.*

II. THE EMOTIONS.

Joy and its various forms.

Facial expression and gestures.

1. *Syncope.*
2. *Sudden death. Effusion of blood into pericardium.*
3. *Sudden death. Cardiac (?)*
4. *Do. Do.*
5. *Cardiac disease, terminating fatally.*
6. *Apoplexy.*
7. *Growth of dark hair in old age.*

8. *Death.*
9. *Do.*
10. *Do.*
11. *Do.*
12. *Do.*
13. *Do.*
14. *Do.*
15. *Do.*
16. *Do.*

Pathology not known, but in all probability the fatal stroke fell upon the heart.

17. *Temporary suspension of paralysis agitans.*
18. *Relief of general loss of power to move, from scurvy (?)*

Grief and its various forms.

Facial expression, and gestures.

1. *Epilepsy.*
2. *Paralysis agitans.*
3. *Chorea.*
4. *Spasm of larynx.*
5. *Hydrophobia. Death.*
6. *Tetanus.*
7. *Aphonia.*
8. *Ptosis.*
9. *Paraplegia.*
10. *Do.*
11. *Death preceded by obstinate vomiting.*
12. *Jaundice.*
13. *Emaciation. Death.*
14. *Phthisis.*
15. *Cutaneous disease.*
16. *Do.*
17. *Gangrene.*
18. *Blanching of the hair.*
19. *Do.*
20. *Anasarca.*
21. *Gastric and hepatic disease.*
22. *Jaundice.*
23. *Arrest of lachrymal secretion.*
24. *Death.*
25. *Beneficial influence in phthisis.*

Hope and Faith.

Facial expression.
General stimulating influence in disease.

1. *Cure of paralysis.*
2. *Do.*
3. *Cure of scurvy.*
4. *Cure of ague.*
5. *Relief of rheumatic pains.*
6. *Do.*
7. *Do*
8. *Do.*
9. *Do*
10. *Do.*
11. *Do.*
12. *Relief of hand contracted from gout.*
13. *Cure of lockjaw.*

Also gently touching the part.

Despair.

Facial expression.
Generally depressing influence in disease.

Self-Esteem.

Facial expression.
Gesture and attitude.

Humility.

Facial expression.
Gestures and attitude.

Courage.

Facial expression.

Fear, Fright, Terror, Anxiety, &c.

Facial expression.

1. *Loss of tactile sensation.*
2. *Partial blindness.*
3. *Deafness.*
4. *Pseudæsthesia.*
5. *Do.*
6. *Acute pain.*
7. *Do.*
8. *Prolonged sense of cold (expectation as well as fear).*
9. *Olfactory hallucination.*
10. *Visual and tactile hallucination*
11. *Quivering of the muscles.*
12. *Epilepsy.*
13. *Do.*
14. *Do. (from a dream).*
15. *Do.*
16. *Do.*

17-51. *Do.*

52. *Convulsions.*
53. *Do.*
54. *(Religious terror) convulsions.*
55. *Do.* *Do.*
56. *Do.* *Do.*
57. *Do.* *tetanus.*
58. *Do.* *Do.*
59. *(Religious terror) tetanic rigidity.*
60. *Do.* *Do.*
61. *Paralysis agitans.*
62. *Do.*
63. *Do.*
64. *Do.*
65. *Chorea.*
66. *Do.*
67. *Do.*
68. *Do.*
69. *Do.*
70. *Do.*
71. *Do.*
72. *Do.*
73. *Do.*
74. *Spasmodic action of the arm.*
75. *Wryneck.*
76. *Singultus.*
77. *Spasm of the pharynx.*
78. *Hydrophobia (virus latent) ending in death.*
79. *Hydrophobia. Death.*
80. *Do.* *Do.*
81. *Do. (very slight).*
82. *Catalepsy, preceded by speechlessness and blindness.*
83. *Aphonia.*
84. *Aphasia.*
85. *Facial paralysis.*
86. *Hemiplegia (right side).*
87. *Do.*
88. *Do.*
89. *Do.*
90. *Paralysis.*
91. *Syncope.*
92. *Fatal syncope.*
93. *Do.*

94. *Fatal syncope.*
95. *Spasm of the heart.*
96. *Death. Cardiac.*
97. *Arterial murmur.*
98. *Inflammation (foot).*
99. *Apoplexy.*
100. *Do.*
101. *Hæmoptysis.*
102. *Blood in the perspiration (bloody sweat).*
103. *Horripilatio.*
104. *Do.*
105. *Jaundice (from spasm).*
106. *Spasm of the bladder.*
107. *Protracted labour.*
108. *Mal-nutrition of fœtus through changes in the mother's blood.*
109. *Do.*
110. *Do.*
111. *Do.*
112. *Do.*
113. *Do.*
114. *Do.*
115. *Gangrenous erysipelas.*
116. *Do.*
117. *Blanching of the hair.*
118. *Do.*
119. *Do.*
120. *Falling off of the hair.*
121. *Decay of the teeth.*
122. *Excessive perspiration.*
123. *Chemical changes in the urine.*
124. *Do.*
125. *Cholera. Death.*
126. *Do.*
127. *Do.*
128. *Arrest of mammary secretion.*
129. *Chemical changes in the milk.*
130. *Ascites (from a frightful dream).*
131. *Absorption of serum.*
132. *Fatal lowering of vital power in fever.*
133. *Smallpox.*
134. *Do.*
135. *Ague.*
136. *Do.*
137. *Rheumatism.*
138. *Do.*
139. *Cure of hysterical neuralgia of hip and knee.*
140. *Cure of epilepsy.*
141. *Cure of paralysis.*
142. *Do.*
143. *Temporary relief of asthma.*
144. *Cure of gout.*
145. *Do.*
146. *Beneficial influence in phthisis.*
147. *Do.*
148. *Relief of dropsy (through kidneys).*
149. *Do.*
150. *Do.*
151. *Relief of dropsy.*
152. *Do.*
153. *Cutting short a drunken fit.*

Calmness.

Facial expression.
Attitude.

Anger.

Facial expression.
Gestures.

1. *Speechlessness.*
2. *Do.*
3. *Do.*
4. *Speechlessness and paralysis.*
5. *Protrusion of brain and throbbing of the arteries.*
6. *Spasm of the heart. Death.*
7. *Hæmoptysis.*
8. *Retarding coagulation of blood in death.*
9. *Chemical changes in the saliva.*
10. *Do.*
11. *Do.*
12. *Do.*
13. *Vomiting vitiated bile.*
14. *Amenorrhœa.*
15. *Chemical changes in the milk.*
16. *Do.*
17. *Cure of paralysis.*
18. *Cutting short a drunken fit.*

Love and Benevolence.

Facial expression.
Gestures.

Hate and Malevolence.

Facial expression.
Gestures.

General Emotional Excitement.

1. *Hysterical anæsthesia.*
2. *General anæsthesia.*
3. *Anæsthesia.*
4. *Laryngismus stridulus.*
5. *Chorea.*
6. *Wryneck.*
7. *Hydrophobia.*
8. *Speechlessness and facial paralysis.*
9. *Arterial murmur.*
10. *Apoplexy.*
11. *Sparkling of the eyes.*
12. *Hemiplegia.*
13. *Do.*
14. *Cancer of the breast.*
15. *Temporary power of speech in a dumb person* (?)
16. *Cure of scurvy.*

III. THE WILL.

Movements.

1. *Visual hallucination.*
2. *Do.*
3. *Do.*
4. *Do.*
5. *Auditory hallucination.*
6. *Simulated* — *Epileptic convulsions.*
7. *Simulated* — *Tetanus.*
8. *Simulated* — *Muscular rigidity.*
9. *Simulated* — *Hemiplegia.*
10. *Respiratory movements after arrest of heart's action.*

11. *Increased frequency of heart's action.*
12. *Arrest of heart's action.*
13. *Do.*
14. *Peristaltic action of the intestines.*
15. *Trance.*
16. *Rumination.*
17. *Checking do.*
18. *Moving the scalp.*
19. *Sweating.*
20. *Shedding tears.*
21. *Contracting and dilating the pupil.*
22. *Do.*
23. *Vomiting.*
24. *Do.*
25. *Waking from trance.*
26. *Cure of hysterical neuralgia of the knee.*
27. (?) *Terminating an epileptic fit.*
28. *Cure of epilepsy.*
29. (?) *Relaxation of contracted hand.*
30. *Arrest of hydrophobia.*
31. *Do.*
32. *Controlling the inversion of the foot.*
33. *Checking cholera.*

Summary of the foregoing Analysis:

I. The Intellect.

Excess of Study	8	
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Total number of Illustrations		430

To these Illustrations I may add the following:—A lady of an exceedingly sensitive and impressible nature, on one occasion, when a gentleman visited her house, experienced a very uncomfortable sensation so long as he was present, and observed a spot or sore on his cheek. Two days after, a similar spot or sore appeared on her cheek, in precisely the same situation, and with the same characters (xix, p. 507). I take this opportunity also of adding to p. 345 a paragraph in reference to Colonel Townshend, which should have been inserted there. On the occasion referred to, "Drs. Cheyne, Baynard, and Mr. Skrine felt his pulse first; 'it was,' says Dr. Cheyne in his 'English Malady,' 'distinct, though small and thready, and his heart had its usual beating. He composed himself on his back, and lay in a still posture some time. I found his pulse sink gradually, till at last I could not feel any, by the most exact and nice touch. Dr. Baynard could not feel the least motion in his breast, nor Mr. Skrine the least soil of breath on the bright mirror he held to his mouth; then each of us by turns examined his arm, heart, and breath, but could not by the nicest scrutiny discover the least symptom of life in him.' They waited some time, and the body continuing in the same state, were about to leave under the impression that the Colonel was actually dead, when a slight motion in his body reassured them; upon examination the pulse and heart were found again in action, and he gradually restored himself. His death-like state lasted half an hour, and recurred at nine in the morning; after which he transacted business with his attorney, and quickly expired at six o'clock in the afternoon; and the body, when examined, presented, with the exception of the right kidney, no signs of disease" (xxvi, VIII, p. 160).

The reader cannot fail to be struck, by a glance at the foregoing statistics, with the large proportion of cases ranged under Fear or Fright. After this Emotion follow in their order of influence, Imagination (and Expectation), the Will, Grief, Anger, Joy, Involuntary Attention, or dominant Ideas, general Emotional Excitement, Hope and Faith, Voluntary Attention, Imitation and Sympathy, Excess of Study, Recollection.

Taking the threefold states of Mind, we have, out of 430 cases analysed, Intellect 154, Emotion 243, Volition 33. This

is, of course, an exceedingly rough estimate of the proportionate influence of these states. Still, it is relatively correct; and in the sense in which the expression "influence of the Mind upon the Body" is employed in this work, we reach by statistics very much the result we should expect, namely, that the direct action of the Will, however important, is the least frequently exerted power in relation to the psycho-physical phenomena which we have been desirous to investigate; that the Intellect, comprising among other faculties that of Attention, directed in the first instance by the Will, exerts a greater influence; while the Emotions far exceed both put together in their action, whether in health or disease, upon the bodily organs and tissues.

One striking fact is elicited by this investigation, that while the emotions are by far the most operative in what we may call chance cures of disease, they have, with the exception of Hope and Faith, which can only be distinguished from simple Expectation by their intensity, comparatively slight influence in regularly designed Psycho-therapeutics, in which the Imagination, Expectation, and Attention play the most important part. I am disposed to think, however, that in Braidism, the remarkable change which can be induced in the circulation by combined physical and psychical processes, answers in great measure to that which occurs from powerful emotional excitement. Hence rheumatism may be relieved in both instances, as, for example, in the railway accident referred to in the Preface, or in the operation performed by Mr. Braid in such a case as that mentioned at p. 414. The condition of the circulation is entirely altered, and local congestions are removed.

Sex, age, position.—As regards *sex*, out of 304 cases in which the sex is stated, 195 were males, and 109 females. The large proportion of the former shows (what is very important) that men are highly susceptible to mental impressions, and that, therefore, Psycho-therapeutics are available for them as well as for women. It is not, as is so often intimated, only hysterical young ladies who come under the influence of this agency. At the same time it would not be fair to conclude from this analysis that men are more or even equally liable to be affected by psychical forces, because the very frequency of examples of

such influence among females prevents medical men reporting them, while they do report cases which occur in men on account of their being rarer, and therefore more interesting. We therefore simply maintain that there is ample proof that the bodies of men as well as women may be largely acted upon by the influence in question. In reference to *age*, it has been impossible to obtain it in the majority of cases, but it may be stated generally that, with the exception of about fifty-five, the individuals were adults, their age probably being, in most instances, between 20 and 35. Lastly, the most frequent forms of disease induced in persons in health were those comprised under convulsive affections, epilepsy, chorea, paralysis agitans, and hydrophobia; while the diseases most frequently benefited were undoubtedly rheumatism, gout, and dropsy, the last-mentioned being relieved by the increased action of the kidneys from mental influence. No doubt, however, if all the cases of hysterical neuralgia and contraction of joints were reported, what are called merely nervous affections of the body would take priority. The only inference which we are justified in drawing from these figures is that the beneficial influence of Psycho-therapeutics is by no means confined to nervous disorders. It is also satisfactory to know that, as respects occupation or position in life, very opposite classes are represented —the rich and the poor, the learned and the ignorant. Even incredulity, when the attention can be arrested, is not necessarily a bar to success. Failure, on the other hand, it must be remembered, may attend all systems of treatment; and what Bacon says in reference to one form of Psycho-therapeutics may be applied to all—"Men are to be admonished that they do not withdraw credit from the operations of the Imagination because the effects fail sometimes."

LIST OF THE PRINCIPAL WORKS REFERRED TO.

I. The Principles of Physiology. By John Augustus Unzer. 1771. A Dissertation on the Functions of the Nervous System. By George Prochaska. 1784. Translated by Dr. Laycock for the Sydenham Society. 1851.

II. The Works of John Hunter. Edited by Mr. Palmer. 1838. 4 vols.

III. Elements of Physiology. By J. Müller, M.D. 1838. Translated by Dr. Baly. 1848. (Separate volume entitled Physiology of the Senses.)

IV. A Treatise on the Nervous Diseases of Women. By Dr. Laycock, 1840.

V. The Edinburgh Medical and Surgical Journal.

VI. Neurypnology; or the Rationale of Nervous Sleep, considered in Relation with Animal Magnetism. By James Braid, M.R.C.S., &c. 1843.

VII. The British and Foreign Medical Review. Edited by Dr. Forbes; and its successor, the British and Foreign Medico-Chirurgical Review.

VIII. Human Physiology. By Dr. Carpenter. 4th Edit. 1853. (Compared with later editions.)

IX. The Psychological Journal. Edited by Dr. Forbes Winslow.

X. Principles of Psychology. By Herbert Spencer. 2nd Edit. 1870. Vol. I.

XI. Elements of the Philosophy of the Human Mind. 3 vols. By Dugald Stewart. 1818.

XII. Ruskin's Modern Painters.

XIII. Life of Sir Philip Francis. 2 vols.

XIV. Lord Bacon's Works. 10 vols. 1826.

XV De la Physionomie. Par Pierre Gratiolet. 1843.

XVI. Chapters on Mental Physiology. By Dr. (afterwards Sir) H. Holland. 1852.

XVII. Practical Observations in Medicine. By Marshall Hall. 1845.

XVIII. The Mesmeric Mania of 1851. By Professor Bennett.

XIX. Letters to a Candid Enquirer on Animal Magnetism. By Professor Gregory. 1851.

XX. Magic, Witchcraft, Animal Magnetism, Hypnotism, and Electro-Biology. By James Braid. 1852.

XXI. The Journal of Mental Science. Edited by Drs. Maudsley and Sibbald.

XXII. Gall's Works on the Functions of the Brain. 1822-26. Translated by Dr. W. Lewis. 6 vols. 1835.

XXIII. The Power of the Mind over the Body. By James Braid. 1846.

XXIV. The Monthly Journal of Medical Science. Edinburgh.

XXV. Beaumont's World of Spirits.

XXVI. Miscellanies. By Dr. J. A. Symonds. 1871.

XXVII. Nicholson's Journal.

XXVIII. Inquiries concerning the Intellectual Powers. By Dr. Abercrombie. 1837.

XXIX. Analysis of the Phenomena of the Human Mind. By James Mill. With Notes by Alexander Bain, Andrew Findlater, and George Grote. Edited with additional notes by J. S. Mill. 2 vols. 1869.

XXX. Psychological Enquiries. By Sir B. C. Brodie, Bart. 1st Series. 2nd Edit. 1855.

XXXI. King's Life of Locke. 2 vols. 1830.

XXXII. British Medical Journal.

XXXIII. The Animal Kingdom. By Emanuel Swedenborg.

XXXIV. A Manual of the Nervous Diseases of Man. By M. H. Romberg, M.D. Translated for the Sydenham Society by Dr. Sieveking. 2 vols. 1853.

XXXV. Annales Médico-Psychologiques. Edited by Baillarger, Cerise, et Longet.

XXXVI. The Zoist. Commenced 1843. Edited by Dr. Elliotson.

XXXVII. On Going to Sleep. By Mr. Charles H. Moore. 1868.

XXXVIII. The Power of the Soul over the Body. By Dr. Moore. 1846.

XXXIX. Essais de Physiologie philosophique. Par J. P. Durand (De Gros). 1866.

XL. Van Swieten. Commentaria in H. Boerhaave Aphorismos decognoscendis et curandis morbis. Edit. 1755.

XLI. Medical Essays. By Mr. J. H. Sealy. 1837.

XLII. On the Nature and Origin of Epilepsy. By Drs. Kussmaul and Tenner. Translated for the New Sydenham Society by Dr. Bronner. 1859.

XLIII. Mental Hygiene. By Dr. Sweetser. 1844.

XLIV. Leçons sur les Propriétés des Tissus Vivants. Par M. Bernard. 1866.

XLV. Medical Times and Gazette.

XLVI. Quarterly Journal of Science. Edited by Mr. Crookes, F.R.S.

XLVII. The Lancet.

XLVIII. Burton's Anatomy of Melancholy. 1651. Edit. 1836.

XLIX. The Human Body and its connection with Man. By J. J. G. Wilkinson, M.R.C.S.

L. Biographical History of Philosophy. By Mr. G. H. Lewes. 1871.

LI. Recherches Physiologiques sur la Vie et la Mort. Par M. F. X. Bichat. 1800. (Edited by Dr. Cerise, 1844.)

LII. Anatomy of the Brain, Spinal Cord, and Ganglions. By Dr. R. B. Todd. 1845.

LIII. Handbook of Physiology. (Based on Müller's Elements.) By Dr. W. S. Kirkes. 1863.

LIV. Trousseau's Clinical Medicine. Translated for the New Sydenham Society by Dr. Bazire. 4 vols. 1868.

LV. Mind and Brain. By Professor Laycock. 2 vols. 1860.

LVI. Philosophical Transactions.

LVII. On the Minute Structure and Functions of the Medulla Oblongata. By Schroeder Van der Kolk. Translated for the New Sydenham Society by Dr. Daniel Moore.

LVIII. Course of Lectures on the Physiology and Pathology of the Central Nervous System. By Dr. C. E. Brown-Séquard, F.R.S. 1860.

LIX. Phantasmata. By R. R. Madden, F.R.C.S. 2 vols. 1857.

LX. De l'Imagination. By J. B. Demangeon. 1829.

LXI. Medical Inquiries and Observations. By Benjamin Rush, M.D., Professor of the Institutes and Practice of Medicine, and of Clinical Practice, in the University of Pennsylvania. 4 vols. in two. 4th Edit. Philadelphia, 1815.

LXII. Chelius's System of Surgery. 2 vols. Edited by John F. South. 1847.

LXIII. An Inquiry into the Nature and Origin of Mental Derangement, comprehending a Concise System of the Physiology and Pathology of the Human Mind. By Alexander Crichton, M.D. 1798.

LXIV. The Physiology and Pathology of the Human Mind. By Henry Maudsley, M.D. 1867.

LXV. The Human Mind in its Relation with the Brain and Nervous System. By Daniel Noble, M.D. 1858.

LXVI. La Médicine des Passions. Par J. B. F. Descuret. 1841.

LXVII. A Dissertation on the Influence of Passions upon Disorders of the Body. By Dr. William Falconer, F.R.S. 1788.

LXVIII. Leçons de Pathologie Experimentale. Par M. Claude Bernard. 1872.

LXIX. Hecker's Epidemics of the Middle Ages. Translated for the Sydenham Society by Dr. Babington. 1844.

LXX. Cyclopædia of Practical Medicine. 3 vols. By Dr. Copland. 1858.

LXXI. Studies on Functional Nervous Disorders. By Dr. C. Handfield Jones, F.R.S. 1870.

LXXII. Principles and Practice of Medicine. By Dr. Thomas Watson. 3rd edition.

LXXIII. Clinical Lectures on Paralysis, &c. By Dr. Todd, F.R.S. 1856.

LXXIV. Sketches from the Case-Book to illustrate the Influence of the Mind on the Body. By R. Fletcher, M.R.C.S. 1833.

LXXV. Zoonomia; or, the Laws of Organic Life. By Dr. Darwin, F.R.S. 2nd Edition. 1796.

LXXVI. On Superstitions connected with the History and Practice of Medicine and Surgery. By T. J. Pettigrew, F.R.S. 1844.

LXXVII. London Hospital Reports. Vol. i. 1864.

LXXVIII. American Journal of Insanity.

LXXIX. The Emotions and the Will. By Alexander Bain, M.A. 2nd Edition. 1865.

LXXX. Theory of the Influence exerted by the Mind over the Body, &c. By John Glen, M.A. 1855.

LXXXI. Mental Pathology and Therapeutics. By W. Griesinger, M.D. Translated for the New Sydenham Society by Drs. Robertson and Rutherford. 1867.

LXXXII. On Hallucinations. By Brierre de Boismont. Translated by Robert T. Hulme, F.L.S. 1860.

LXXXIII. Of the Imagination as a Cause and as a Cure of Diseases of the Body, exemplified by fictitious Tractors and Epidemic Convulsions. By Dr. Haygarth. 1801.

LXXXIV. Observations on the Nature and Treatment of Certain Forms of Paralysis. By James Braid. 1855.

LXXXV. The Philosophy of Sleep. By Robert Macnish. 3rd Edition. 1836.

LXXXVI. Percy Anecdotes.

LXXXVII. Practical Instruction in Animal Magnetism. By J. P. F. Deleuze. Translated by T. C. Hartshorn. 4th Edition. 1850.

LXXXVIII. Facts in Mesmerism, with Reasons for a Dispassionate Inquiry into it. By Rev. Chauncy Hare Townsend, A.M. 1844.

LXXXIX. Numerous Cases of Surgical Operation without Pain in the Mesmeric State. By Dr. Elliotson. 1843.

XC. An Authentic Narrative of the Extraordinary Cure performed by Prince Hohenlohe on Miss O'Connor, a nun in the Convent of New Hall, near Chelmsford. Dr. Badeley, Protestant Physician to the Convent. 1823.

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