

heart, while each are special exciting causes to the nervous system, it appears that all these causes or properties are distinct elements of the mental and instinctive principle; just as irritability, sensibility, mobility, &c., are distinct properties or elements of the vital principle (§ 175 *b*, 183, 188½ *d*, 234 *c*, 476 *c*, 1067, 1072 *b*).

500, *i*. Consider, again, how different agents applied to different parts will affect particular organs, remotely situated, in a very uniform manner, and, by common consent, through the nervous system; as the respiratory muscles, for example (§ 137). "The whole system of respiratory nerves can be excited to action by irritation of any part of the mucous membrane, from the mouth to the anus, from the nostrils to the lungs." This irritation may be established, and result in increased respiratory movements, by mechanical agents, as by tickling the fauces, and by many others through their intrinsic virtues, as tobacco applied to the nose. But, what is more remarkable, respiration may be also accelerated by impressions made upon particular parts of the surface of the body, as by tickling the feet; and again, by a strong light impinging on the retina; and yet, again, by hope and fear, by love and hatred. These examples embrace all the varieties that occur between the simple act of respiration and coughing, sneezing, and convulsive spasm. Again, another modified order of movements may be induced in the same muscles by agents of yet other virtues; as from the irritation of emetics. Mechanical irritations of the throat may also determine either coughing or vomiting; and here, as with the increased respiratory movements, certain irritations of the surface, as tobacco to the soles of the feet, will excite the abdominal muscles to the act of vomiting. In this last case, however, the irritation is first transmitted, sympathetically, to the mucous tissue of the stomach (§ 504), from whence it is returned to the nervous centres, and from thence reflected upon the respiratory muscles, the skin, &c. (§ 504, 514 *d*, *k*, *l*).

It will be thus seen, that these various agents, acting upon different parts, give rise to analogous or similar phenomena through the medium of the nervous power, but they involve a great variety of sensitive nerves, while the motor nerves are about the same in all the cases.

500, *j*. But, the foregoing complexity, which must find its solution in the attributes of the nervous power operating through its anatomical medium, is vastly increased by the coincident phenomena which may be determined by the will and by mental emotions. Thus, increased respiration, coughing, vomiting, &c., may be produced by an act of the will; grief occasions weeping and sighing; joy, laughter; yawning gives rise to yawning in another; disagreeable recollections produce vomiting, &c.

500, *k*. It is readily seen that a common philosophy must interpret all the foregoing effects. The fundamental cause is the same throughout. It is every where the influence of the nervous power; but what strange variety in the remote exciting causes! Nor is this all; for the same great and simple law obtains in all voluntary movements. Let us also especially remark the parallel which exists between the determination of the will upon particular muscles, according to its own choice, and thus constantly passing over, or isolating, various motor nerves, or, yet more remarkably, sending its influences through certain branches of a compound nerve and holding in passive subjection

reflection of this irritation upon the respiratory nerves. But the stimulus of the sun's light may produce sneezing by acting first upon the optic nerve, and through that medium upon the nervous centres. The nervous power thus developed is reflected upon the Schneiderian membrane through the branches of the fifth pair which impart common sensibility to the nose (§ 198). Here a new sensation arises, which is sent back to the brain and spinal cord, the nervous power again developed, and, according to relations between that membrane and the respiratory organs, and the nature of the remote cause, the nervous power is now reflected upon the respiratory muscles, when sneezing follows as the result of the convulsive movement. (See, in connection, § 188½ *d*, 500 *n*.)

The mind itself will do the same thing by dwelling intensely on a former paroxysm of sneezing. Here the nervous power is excited in a direct manner by the mind, and is then, as in the foregoing case, directed upon the nasal branch of the fifth pair. And so of sympathetic yawning, sympathetic micturition, &c.

514, *m*. The olfactory nerve is mostly endowed with specific sensibility, and is only excited by odors, while they have no such effect upon the nasal branches of the fifth pair, unless the odors be at the same time of a pungent nature; and then it is the *pungency*, not the *odor*, that operates. Odors affect the mind agreeably or disagreeably. The smell of a rose may have no other effect than that of so impressing the brain as to give rise to a pleasurable sensation. But, in some constitutions, its impression will excite a very complex train of sympathies. Its effect may be at first pleasurable, but followed immediately by the transmission of a disturbing influence to the heart, or stomach, or even to the intestines. The heart may be thus depressed in its action, the stomach nauseated, and the bowels have been purged by the same cause. Hence the poet's expression, to "die of a rose in aromatic pain." Even the recollection of disagreeable results from offensive odors brings on nausea and vomiting (§ 500, *i*. See, in connection, § 188½ *d*).

*Laws of Action of the Sympathetic Nerve, and the Propagation of Impressions in it.*

514½, *a*. Having now, and in former sections (§ 471–475, 477–496, 500), stated the most important facts and laws which relate to the cerebro-spinal system, whether acting independently, or in connection with the sympathetic nerve, I shall proceed to speak of those which concern especially the latter system. But the cerebro-spinal is so interwoven with the sympathetic nerve, it is obvious that the influences which appertain to the brain and spinal cord must be more or less common to the ganglionic nerve (§ 115).

514½, *b*. The following laws are generally inferable from what has been already said of the nervous power, and of sympathy. But, I have deemed it most useful to the young student of medicine, and possibly to the more advanced, to present them in a brief and systematic form, with comments of a practical nature. The quotations are from Müller, unless otherwise stated. In this branch of physiology, Müller is eminently philosophical; and in thus adhering to the path of nature, he is arrayed in opposition to those chemical and physical views with which he has thought proper to oblige the mate-

that which is abstracted; from which the conclusion is drawn that the same substances are taken into the circulation when administered by the stomach, and that they then and there change the color of the blood in like manner; which proves that the remedial effect is exerted upon that fluid. There is no doctrine in humoralism more strenuously maintained, and none in which the conclusions are considered more logical. It goes with the rest in representing the nature of the "experimental philosophy" which now lies at the basis of theoretical and practical medicine.

844. Finally, an author of the olden times, writing in the palmiest days of humoralism, but not of the professional corps, in one of his sallies upon the vagaries of philosophy, let slip a bolt which demolishes every material fabric in medicine.

"All the world knows," he says, "there is no virtue in charms; but a strong conceit and opinion alone, which forceth the humors (*moral ones*), spirits, and blood, which takes away the cause of the malady from the parts affected. The like we may say of our magical effects, superstitious cures, such as are done by mountebanks and wizzards (§ 167 *f*, note). An empyric oftentimes, and a silly chirurgeon, doeth more strange cures than a rational physician. Nymannus gives a reason: because the patient puts his confidence in him, which Avicenna prefers before art, and all remedies whatsoever. 'Tis opinion alone, saith Cardan, that makes or mars physicians; and he doeth the best cures, according to Hippocrates, in whom most trust. So diversely doth this phantasie of ours affect, turn, and wind, so imperiously command our bodies, which, as another Proteus, or a chameleon, can take all shapes, and is of such force, as Facius adds, that it can work upon others as well as ourselves. How can otherwise blear-eyes in one man cause the like affection in another? How does one man's yawning make another yawn?—one man's p—ing provoke a second many times to p? Why does scraping of trenchers offend a third, or hacking of files? Why do witches and old women fascinate and bewitch children, but, as Wierus, Paracelsus, Cardan, Mizaldus, Valleriola, Vannius, Campanella, and many philosophers *think*, the forcible imagination of the one party nerves and alters the spirits of the other? Nay, more, they can cause and cure not only diseases, maladies, and several infirmities, by this means, as Avicenna supposeth, in parties remote, but move bodies from their places, cause thunder, lightning, tempests; which opinion Alkiadus, Paracelsus, and some others approve of; so that I may certainly conclude, this strong conceit or imagination is *astrum hominis*, and the rudder of this our ship, which reason should steer, but overborne by phantasie, cannot manage, and so suffers itself and this whole vessel of ours to be overruled, and often overturned" (§ 167 *f*, note, 227, 234 *e*, 500 *f*, *o*, 509, 638, 1072).

845. Having now considered the grounds upon which the humoral pathology reposes, and how estranged from the institutions of organic nature, I shall proceed to offer the reader a condensed view of my argument predicated alone of the fundamental laws of physiology.

I propose showing by this argument, that the blood is neither a *primary* cause of disease in the solids, in virtue of its own morbid condition, nor an *aggravating* cause of disease when altered in its character by the morbid action of the solids.

the nervous power is excited and reflected upon the organic properties of the muscles of respiration, through the various motor nerves of those organs. These muscles are, in consequence, thrown into action, and the thorax expanded (§ 233 $\frac{1}{2}$ , 500 *e*, 514 *l*, &c.).

If the foregoing simple, demonstrable exemplification be duly comprehended, there can be no difficulty with all the rest. In the example of sneezing, as a consequence of the action of light upon the eyes (§ 514, *l*), the process is more complex, and shadows forth the far more intricate movements that are in progress,—the almost endless circles of sympathy which are taking place,—during the progress or decline of disease, or those which are set up by the operation of an emetic, a cathartic, &c. (§ 1040).

902, *d*. Physiological examples of the foregoing nature abound in the animal organization, and supply the most ample ground for the interpretation of the effects of remedial and morbid agents in their wide range of influences. The modifications of the circles of sympathy which relate to the respiratory system alone, as in coughing, crying, laughing, yawning, &c., are a fruitful field of inquiry into great and precise laws, and extensively applicable to the philosophy of medicine. The only difference is, that, when disease is established in a part, or when remedial agents operate, the organic properties of the part are altered in their nature, and, of course, the organic actions over which they preside. A specific impression, in the latter cases, is transmitted to the cerebro-spinal axis, the nervous power more or less modified in a corresponding manner, and from thence reflected through other nerves, or other fibres, to the same or other parts, and, according to the nature of the modification, disease will be produced or mitigated in those parts. However complex, and variable, therefore, the phenomena, nothing can be more simple than the principle through which all these changes are produced.

902, *e*. When an emetic operates, the *modus operandi* is essentially similar to what happens in respiration. The mucous tissue of the stomach being the point of departure, a different influence is propagated to the nervous centres, corresponding with the nature of the exciting cause, with the special vital constitution of that portion of the mucous tissue, with the compound nature of the stomach, with the special relations of this organ to the central parts of the nervous system and to the respiratory muscles, &c. (§ 138, 149, 150, &c.), while the nervous power is also modified in its nature according to the peculiar virtues of the emetic (§ 227). The most sensible result, as in respiration, depends upon the reflection of the nervous power upon the respiratory muscles, while another current descends through the motor fibres of the pneumogastric and sympathetic nerves to the muscular tissue of the stomach. If the emetic operate also as a cathartic, then a new chain of actions is established, in the same way, upon the abdominal muscles, while a current of the nervous power is propagated upon the muscular coat of the intestines (§ 233 $\frac{1}{2}$ ).

902, *f*. But, in the foregoing case, something more happens than in the natural processes. Here the exciting cause possesses peculiar virtues, is of a morbid nature, and it not only makes peculiar impressions upon the alimentary mucous tissue, according to the exact nature of its virtues, but it modifies the nervous power in a corresponding manner. If the stomach be the seat of disease, the direct impres-

seen in the humble designs which are devised and executed by man, and which, indeed, is all that we know of Him except from Revelation, it would unavoidably follow, upon the doctrines of materialism, that all the Designs of the Almighty Being were equally the results of chemical or organic processes! Or is this to be excluded from the pale of "science"?

The questions and arguments now propounded must be answered consistently, and in some conformity with the hypotheses drawn from analogy. If that can be done (this simple physiological requisite alone), then it must be conceded that the analogy is entitled to the gravest consideration. So, on the other hand, should the hypotheses fail in this indispensable requisite, materialism must stand convicted of sophistry, insincerity, and a leaning to infidelity.

Here we might bring our demonstration to a close as it respects the existence of the Soul, and its power of instituting actions in connection with the material fabric. But there may be some who may be inclined to follow us in a more extended inquiry than has now been presented, especially as the demonstration will continue to be predicated of admitted facts and principles, as set forth in these Institutes.

§ 1077. What will be presented in the present section is mostly a series of physiological examples which concur with the foregoing in enforcing the conclusions at which we have already arrived.

It has been seen, extensively, that impressions upon the nervous centres, by which the nervous influence is developed and determined with various effects upon distant parts, are all upon a par, in principle, whether they result from agents applied directly to the centres themselves, or be transmitted to them through the medium of parts remotely situated, or whether the Will and Passions make their demonstrations. Take some of the examples among the muscles which are both voluntary and involuntary. Let these be, again, the respiratory muscles, including those of the face. Now, their several movements are liable to numerous modifications, some of which are natural, as in sneezing, coughing, yawning, laughing, and others more or less morbid, as asthma, hiccough, &c. In all but two of these cases the movements depend upon the excitement of the nervous power through some sensitive nerve, which are generally the sensitive fibres of the pneumogastric, and the reflection of that power from the brain and spinal cord, through motor nerves, upon a part of or upon the whole of the respiratory muscles. In each process there is a special irritation of the nervous centres, and in each the nervous influence is brought into operation in a peculiar manner, and according to that manner is the nature of the movement. In *Asthma*, a stronger irritation is propagated from the lungs to the nervous centres, and a more intense motor excitement is reflected from the centres upon all the muscles of respiration (often including those of the face), than in ordinary breathing, and in some cases the Will comes to the aid of the irritation propagated from the lungs. Here, then, it is seen that a prompting of the *Mind* and the *physical causes* are brought into immediate *co-operation* in rousing the brain and spinal cord. The physical cause is insufficient to excite the requisite movements of the respiratory muscles, and therefore the Mind lends its assistance. Both act in perfect harmony together; nor can the slightest difference be observed in the results of either, excepting as the Mind acts with greater energy, and brings the respiratory muscles of the face into action.

Now, upon the physical hypotheses of intellection, what is it that

blows upon the head, and it will be seen, as plainly as we see that the physical blow upon the brain is the cause in one case and the odours in others, that the Mind inflicts the blow in the remaining series, or that of joy, anger, the lancet, &c. The physiological effects prove conclusively, both in their nature and coincidence, that one cause is as much an agent acting upon the brain as the other, and that both are equally distinct from the organ (§ 514 *m*, 844 *a*, 892 $\frac{3}{4}$  *b*, 944 *b*, 951). In all the cases where the physiological effects are consequent upon mental processes, the Mind and the effects stand in the same relation as do the physical causes and their effects in the other cases, and where the effects are precisely the same in both series. To suppose the absence of a cause in the former is a physiological absurdity, and to suppose any other primary cause than the Mind, as a *self-acting Agent*, is a greater absurdity. Nay more, the Mind, the brain, and the cerebro-spinal nerves are absolutely indispensable to all voluntary movements, however true it be that the power by which the movements are accomplished is implanted in the muscles (§ 258–267, &c.); while the motions of organs in organic life may go on without Mind, brain, or nerves—at least cerebro-spinal nerves (§ 264, 455 *a*, 461 $\frac{1}{2}$  *a*, 1042).

I have said that in the several modified movements of the respiratory muscles mentioned at the beginning of this section, all but two depend upon irritations of the nervous centres propagated through sensitive nervous fibres from the lungs or other parts, and that, in all the cases, *the same excito-motory nerves* bring the muscles into action. The two exceptions are voluntary laughing and yawning. In the former case, the Mind, unlike involuntary laughing, rouses the brain without the intervention of any sensitive nerves, and determines the nervous influence directly upon the muscles of the face through the excito-motory nerves; which is also true of the bloodvessels of the face in blushing, and of the production of tears in weeping, though in the latter instances the nervous influence is propagated upon the face and gland through motor fibres of the sympathetic nerve.

In *ordinary yawning*, which is exactly a modified form of respiration, the Mind may have but little or no participation in the act, but it may depend alone upon a physical impression transmitted from the lungs to the nervous centres, along, perhaps, with a concurring sense of uneasiness propagated from the voluntary muscles; or, if the Mind participate, as in its efforts to relieve a sense of weariness, the physical and mental causes act in co-operation, just as happens in severe cases of asthma. At other times, a very different chain of causation may be observed, and where, also, the mental and physical causes appear to identify themselves, as it were, with each other, as in *sympathetic yawning*, where one yawns on seeing or hearing another yawn, or in talking about it; for, in one case, an irritation is propagated both to the brain and Mind through the optic nerve, and in the other case through the auditory nerve, and simultaneously the Mind conspires with the physical irritations in exciting the nervous influence, and directing it upon the muscles of respiration. But a paroxysm of yawning may be readily consequent upon simply *thinking* about it, as will probably be the case with many on reading this statement; when the reader will, doubtless, feel quite assured that his mind is as exclusively the cause in this instance, as the physical irritation commonly is in *ordinary yawning*.

Just so, too, in respect to offensive odours, when they produce vomit-

ing instead of *syncope*. In the former case the Mind is far more interested in the physiological effects than in the case of *syncope* from analogous odours; since the odours may be so far different in the two series that *disgust* is in operation in one, but not in the other. A rose may occasion *syncope* when just plucked from the bush, but vomiting only when in a decaying state. The Mind, therefore, in the case of vomiting, and the nervous influence, are brought into simultaneous operation by the transmitted impression, and the Mind then co-operates with the physical impression and occasions a farther development of the nervous power, and thus increases the intensity of that degree which is created by the physical impression. But the odours may produce either vomiting or *syncope*, as also purging, by their own independent influence, and in opposition to all resistance of the Mind; or, on the other hand, the Mind, as in breathing, yawning, and coughing, may be adequate to the entire effect, for it will produce vomiting by reflecting upon the former action of the odour, and which may have happened years antecedently. *Sympathetic* vomiting, on seeing or hearing another vomit, is mostly of this nature; but here, too, as in the case of the odours, the mind alone may determine an act of vomiting by simply reflecting upon a disgusting spectacle which had at a former time upset the stomach (§ 514 m, 844, 892 $\frac{3}{4}$ ).

To render the foregoing readily intelligible to the student, farther explanations will be made. He has become sufficiently enlightened by the demonstration to see that, in all the examples, the Mind is necessarily a substantive agent, acting of itself upon the brain. The nervous influence which it develops, in the cases of vomiting, is exactly equivalent to that which arises from the action of an emetic upon the stomach. There is, however, one more link in the chain of causation in the former than the latter case; for when the Mind is the exciting cause, the nervous power is first projected upon the mucous coat of the stomach, where it irritates the organ after the manner of an emetic. This irritation is then reverberated, as in the case of the emetic, upon the nervous centre, and thence reflected upon the diaphragm,\* abdominal muscles, and muscular coat of the stomach, by which they are brought into spasmodic action. When vomiting is produced by *tickling the throat*, the Mind has no connection with the effects, but the physiology is so exactly coincident with that which is relative to the Mind, that it goes with the rest in showing how the Mind is necessarily a *substantive, self-acting* cause. The chain of causation is the same here as in the case of the Mind, only the first development of the nervous power is produced by the irritation of the throat (§ 233 $\frac{3}{4}$ , 500 e-k, 514 b, c, 894-896, 902 e-g).

Whenever vomiting springs from disturbance, or disease, or any novel conditions of organs remote from the stomach and brain, the same chain of causation obtains as in irritating the throat; the point of departure being the affected part, and the nerves supplying it are the organs of transmission to the nervous centres. When the irritation, in these physical cases, is thus made upon those centres, it is exactly equivalent to the mental irritation when the Mind is the remote cause of vomiting, and the subsequent steps in the process are exactly the same in all the cases. The sickness and vomiting which spring from sailing, whirling, riding, &c., depend upon the same chain of influences. In these examples, the remote impressions which are propagated to the brain arise, in part, from mechanical effects upon different organs, and they are, in

\* Probably.

Vill—*continued.*

since the same limitation of effects applies in health with the precision of laws to the Will and Mental Emotions, and as the Will has the nervous medium through which physical agents produce their effects under its own self-acting control in its office of voluntary motion, and as some of the Mental Emotions rarely institute reflex actions, but are restricted to one half of the supposed galvanic circuit, and as the Will nearly always operates exclusively through the motor half,\* the proof becomes conclusive that our Chemical friends must look for some other instrumentality than galvanism or any of their known agencies or laws to expound the problems of life and disease. See *foregoing references*; CAUSES, MORBIFIC; REMEDIES, MENTAL EMOTIONS, the individual *Passions*, REMEDIAL ACTION, REFLEX ACTION, STRUCTURE, *Index II.* employed in demonstrating the substantive existence and self-acting nature of the Soul and Instinctive Principle, p. 874-879, § 1071-1075.

## Y.

## Yawning

may be the result of thinking about it, or of mental sympathy, or of weariness, and depends immediately upon complex influences of direct and reflex actions of the nervous system—the former cases displaying the incipient development by the direct action of the mind and a consequent institution, through its irritation of the pulmonary mucous tissue, of reflex action, as in involuntary respiration, and after the manner of Disgust in producing vomiting, while in the latter case the primary influence of the nervous centres proceeds from the voluntary muscles—employed in expounding the modus operandi of mor-

Yawning—*continued.*

bific and remedial agents, and in demonstrating the substantive existence and self-acting power of the Soul, p. 327-328, § 500 *j-m*; p. 340, § 514 *k-m*; p. 534, § 844; p. 631-632, § 892 *b*; p. 888-889, § 1077. Also, DISGUST, SNEEZING, SEA-SICKNESS, EXERCISE, MENTAL EMOTIONS, &c., *Index II.*

YOUTH—*continued from Index I.*

its various developments are strongly illustrative of the natural mutability of the properties of life which is greatly designed to fulfil the exigencies incident to the progressive stages from Infancy to Manhood, and from which arise diseases and their cure—thus supplying, also, natural examples of well-marked alterative influences of the nervous system in the deep recesses of organic life, since all the remarkable mutations which characterize this stage of progress, and much of its moral attributes, are mainly owing to the development of the organs of generation, and an attendant alterative influence of reflex nervous action, whose centripetal source is especially the testes in one sex and the ovaria in the other—and farther illustrated by the differences between the perfect and altered animal, while, also, the physiological changes become the groundwork of new diseases or modifications of former ones, and all serving as a standard of interpretation of the modus operandi of morbid and remedial agents, physical and mental, p. 55, § 117; p. 56, § 120; p. 61, § 133 *c*; p. 68-69, § 153-159; p. 121, § 237; p. 352, § 524 *d*; p. 376-378, § 578. Also, ORGANS OF GENERATION, PARTURITION, PREGNANCY, ALTERATIVES, PREDISPOSITION, MIASM; ANTIMONY, TARTARIZED; REFLEX ACTION, *Index II.*; VITAL PROPERTIES, ORGANIC LIFE, *Index I.*

\* The Chemist is desired to consider particularly this fact.