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TETANUS

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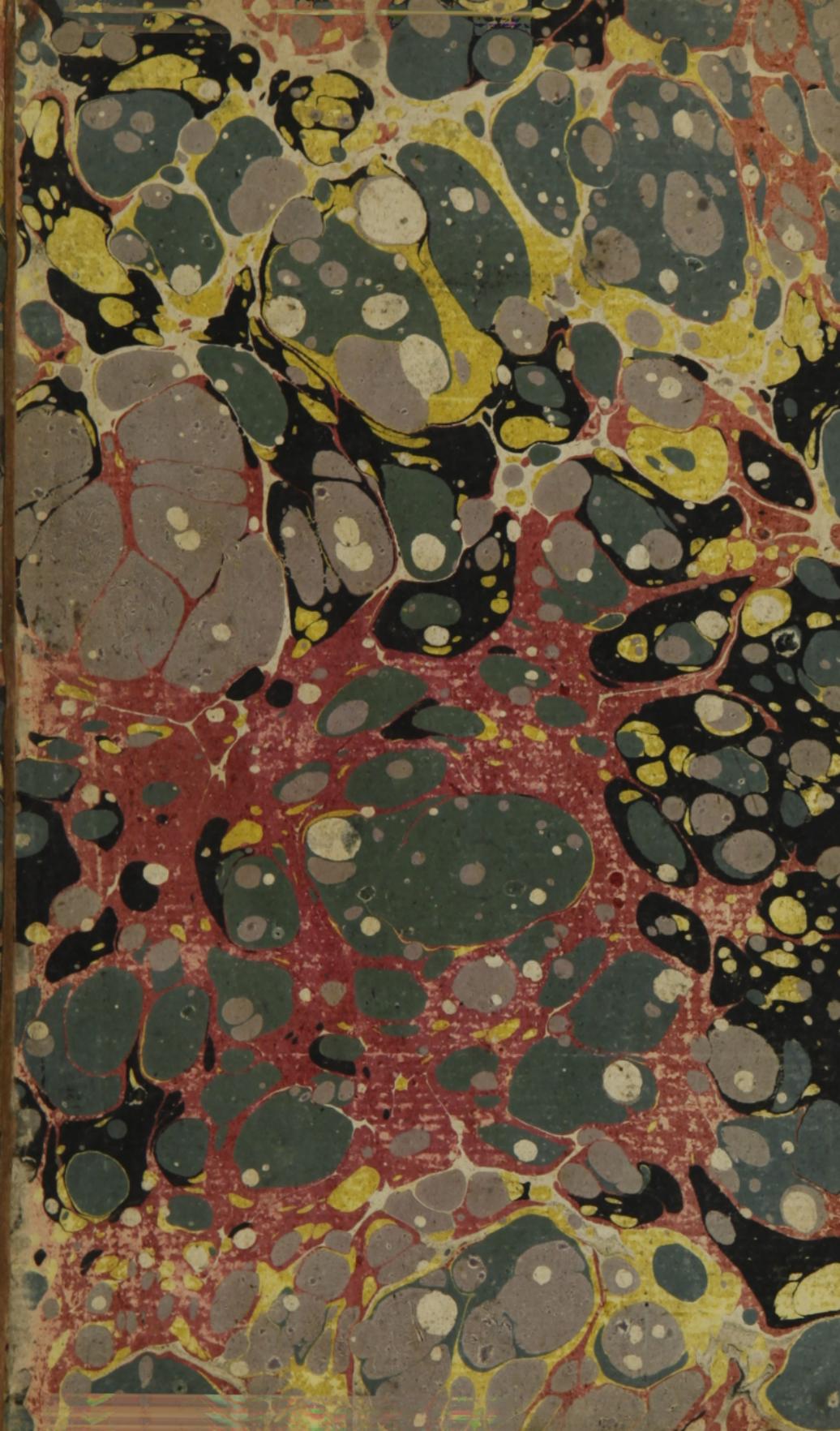
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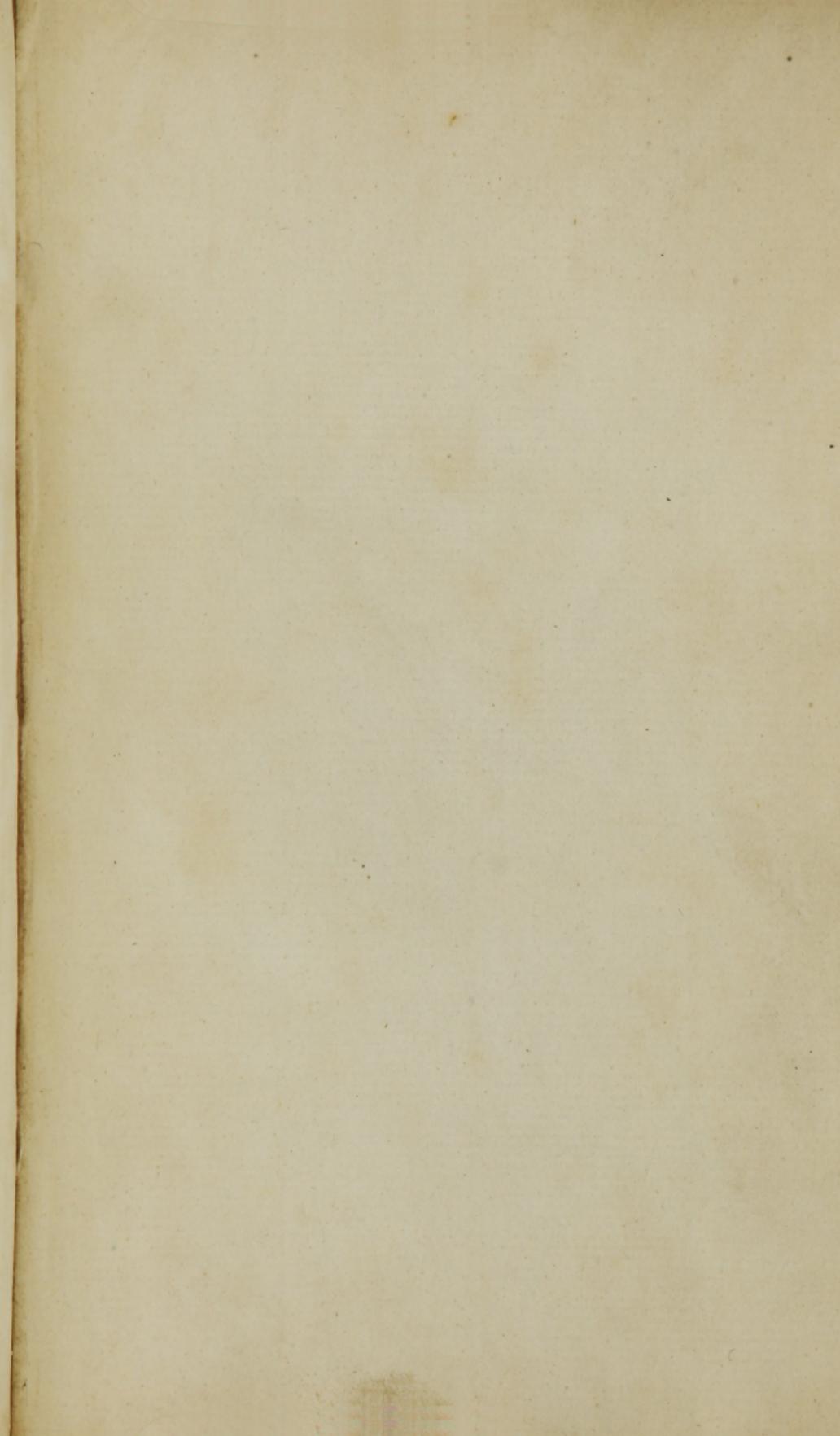
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AN  
INAUGURAL DISSERTATION,

ON THE  
ANIMATING PRINCIPLE, OR ANIMA MUNDI;

HOW AFFORDED, AND HOW ACTING IN MAN; AND HOW ACTED UPON  
IN THAT DISEASE COMMONLY DENOMINATED,

TETANUS OR LOCK-JAW.

READ AND DEFENDED AT A

PUBLIC EXAMINATION,

HELD BY THE MEDICAL PROFESSORS, BEFORE THE  
REV. JOSEPH WILLARD, S. T. D. PRESIDENT,  
AND THE GOVERNORS OF THE UNIVERSITY AT CAMBRIDGE,  
FOR THE DEGREE OF BACHELOR IN MEDICINE,  
JULY 3d. 1795.

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BY FREDERICK MAY, A.M.

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“LIVES THRO’ ALL LIFE, EXTENDS THRO’ ALL EXTENT,  
SPREADS UNDIVIDED, OPERATES UNSPENT.” POPE.

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1795.

IN A FOUR VOLUME DISSERTATION

John M. Smith, M.D.

ANATOMICAL AND PHYSIOLOGICAL

OF THE HUMAN SYSTEM

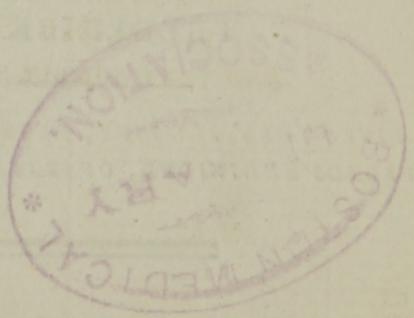
BY JOHN M. SMITH, M.D.

OF THE UNIVERSITY OF MICHIGAN

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TO

John Warren, M. D.

PROFESSOR OF ANATOMY AND SURGERY IN THE UNIVERSITY  
AT CAMBRIDGE, FELLOW OF THE AMERICAN  
ACADEMY OF ARTS AND SCIENCES,  
CORRESPONDING MEMBER  
OF THE  
LONDON MEDICAL, AND MEMBER OF THE MASSACHUSETTS  
MEDICAL SOCIETIES,  
MEMBER OF THE MASSACHUSETTS AND PHILADELPHIA  
AGRICULTURAL SOCIETIES,  
AND SECOND VICE PRESIDENT OF THE HUMANE SOCIETY.

---

IN TESTIMONY,

OF THE MOST SINCERE GRATITUDE AND HIGH RESPECT,  
FOR HIS KIND ATTENTIONS AS A PRECEPTOR,  
HIS MANY VIRTUES AS A MAN,  
AND HIS SUPERIOR EMINENCE AS A PHYSICIAN,  
THE FOLLOWING PAGES ARE  
HUMBLY INSCRIBED BY  
HIS OBLIGED PUPIL  
AND VERY HUMBLE SERVANT,

*Frederick May.*

52/519

John Tyndal, M.D.

THE HUMAN MIND AS A MIRROR

The human mind is a mirror, and as such, it reflects the world around it. It is not a passive receptor of information, but an active participant in the process of knowledge. The mind's capacity to reflect is not limited to the physical world, but extends to the realm of ideas and emotions. This reflection is not a simple, direct copy, but a complex, interpretive process. The mind filters and organizes the information it receives, creating a unique representation of reality. This process is influenced by the individual's experiences, beliefs, and emotions. The mind's mirror is not perfect, but it is a powerful tool for understanding the world. It allows us to see beyond the surface of things, to uncover the hidden meanings and connections that shape our lives. The human mind is a remarkable achievement of nature, and it is our duty to explore its depths and uncover its secrets.

AN

INAUGURAL DISSERTATION,

ON THE

TETANUS OR LOCK-JAW.

IN every branch of human knowledge we find some points unsettled, and some principles obscure. No profession perhaps presents more than ours. And although the medical horizon now brightens from the obscurity of various, and contending theories, which are now exploded, and from clouds of obstinate and incurable diseases, which are now better and more successfully treated; yet, unfortunately for humanity, there are yet some principles unknown, some diseases which baffle every exertion of the physician. Among the former is the very first principle of animation, or the nervous influence, how afforded, and how acting. This is a question of the first magnitude in the philosophy of nature, as well as in the

physiology and pathology of the animal machine. Among the latter is a disease, which frequently arises from the smallest trifle, progresses with a most violent and rapid increase, resists the most active exertions of nature, and studious applications of the physician; and generally terminates only with life. A disorder so trifling in its origin, so formidable in its appearance, and so fatal in its termination, must rouse the attention and awaken the sensibility of every one to ascertain those most important points, its seat and cure. The name usually given to this disease is tetanus or lock-jaw: and in order to treat it methodically, it will be necessary to consider first, and particularly, its seat; then its nature, cause and effects; and lastly its cure.

#### SEAT.

Its seat undoubtedly is on the brain and nerves. Here then we are naturally led to that unbounded, and unenlightened field, which has been so variously trodden, that no distinct path can be discovered to guide the unexperienced investigator. Some physicians have supposed the brain a gland which

secretes, and the nerves a compages of vessels which excretes, a fluid from the blood denominated the nervous fluid ; and which they have considered as the origin and support of life. Others have fancied the nerves elastick cords, which like the strings of a musical instrument, vibrate sensation to the brain, as the latter does its sounds to the ear. But however ingenious these theories may appear, when attentively considered, they are evidently erroneous. For the assertors of the former opinion have never yet discovered either vessels, or fluid, or sufficient organization in the brain, to propel a fluid through such minute vessels. And is it possible that a fluid so subtile as to elude our sight, even when armed with the most magnifying optick glass, should be absorbed from the aliment, circulate in the blood, and be secreted by the brain, when there are such large excretories by which it might be otherwise continually pouring off? And is it not the height of absurdity to suppose that strings should vibrate, which are perfectly inelastick, and which instead of being straight, pass in innumerable directions, and form various angles? But it will

not answer to reject these theories unless another more plausible can be substituted.

THE universe is an immense body of organized and animated matter. Its animating principle is a certain subtile and essential fluid, which pervades every particle of matter; and which, by the degree of its distribution and manner of combination, forms the infinite variety that we observe in nature. This fluid, whatever arbitrary name it may have, whether *light* when vibrating in the air, *fire* in the chimney, *heat* when excited by friction, *electricity* when collected from the atmosphere, *phlogiston* in metals, the *magnetick fluid* in the load-stone, or the *nervous fluid* in animals, is still the same essential fluid. These various phenomena require an explanation. Light is produced by the action of the great luminary on the fluid in the air, putting it in an active state of vibration. Fire is a more active state of vibration, supported by a greater quantity of the fluid. Electricity, a quantity of the fluid collected uncombined. The magnetick is proved to be the same with the electric fluid, by the

property which the latter has of imparting magnetism to \* steel. And that the nervous influence is the same, will be attempted to be proved hereafter. But that there is an extreme similarity, if not identity, is made probable by the recent discovery of that principle called animal electricity; which is ably supported by the demonstrable experiments of its immortal discoverer † Galvani, and his ingenious commentator Valli.

SOLIDITY is the natural state of unorganized matter; and although we know of no substance but what is fluid in a degree, yet we find various degrees of fluidity, and that degree depends on the proportion of the essential fluid which it possesses. This is proved by a solid's becoming more fluid, by the addition of the principle in the form of fire; and the fluid, more solid by its diminution. Hence the melting of metals; and even one of the hardest substances in

\* Enfield's Philosophy.

† They took various animals, some of which had been dead two or three days, and by passing electric shocks through their nerves produced violent, and continued contractions.

nature, the diamond, becomes \* volatile, when subjected to the concentrated rays of a large lens. Again, take away the principle from water, and it becomes solid. And the difficulty of reducing a fluid into a solid state, is a scale to determine the degree of the animating principle which it possesses. We find therefore that † mercury possesses more of the essential fluid than water; and accordingly when introduced into the animal machine, it produces a high stimulus. Spirit is still further endowed with this principle of fluidity, and has emphatically been called "liquid fire," and when taken into the stomach, it is attended with a still higher degree of stimulus. It is therefore a just and natural inference, that air, which never yet has been made solid, which is the best vehicle of light, and in which electricity exists in the greatest quantity, possesses the greatest proportion of this animating fluid.

\* Macquer's Chymistry.

† It is well known, that it requires the most intense cold, to reduce mercury to a solid state; but the greatest degree of natural and artificial cold, never has produced this effect on spirit.

THESE observations are premised to show the universality of the principle, and that air is its seat in by far the greatest quantity. It shall now be applied to the animal machine.

THE animal, *man*, is formed of the same original elements, and animated by the same vivifying fluid, as every other substance in nature. He is provided with a set of muscles for motion, of glandular viscera for assimilating, and absorbent viscera for separating the nutritive part from his aliment; and a vascular system, for depositing this nourishment in the wasting parts of the machine. But these all are dependent, and the muscle could not move, nor the viscera perform their functions, were this animating principle absent. The manner in which it is afforded then, becomes a question of the utmost importance. Does the food contain it? No. Is it absorbed in the chyle and secreted from the blood? No. These have their appropriate use to nourish. Nor can we suppose that they possess more of the principle of animation, than substances in general.

THERE is an organ whose principle use heretofore has been supposed to be, merely to allow the blood to circulate through it, and more intimately to mix its unaffimilated parts. This viscus, the lungs, which manifests its importance by being more secure than any other, except the brain, the receptacle of the animating principle, is so constructed as to expose an immensely large surface to the contact of the air. Shall we then degrade its use to a mere unnecessary action, or shall we not rather appropriate it to the purpose of absorbing this principle of animation? It has already been proved that the fluid exists in greatest quantity in the air, and the lungs undoubtedly are the most suitable for separating it; and now if it can be made probable that there is a decomposition of, and absorption from the air, whilst in the lungs, it will amount to a strong presumption that the fluid passes in this way. It is an undoubted fact, that there is a change in the air whilst in the lungs. What this change is, deserves inquiry. The atmospherick air, according to chymists, is principally composed of two kinds, the phlogisticated, which is noxious, and the

dephlogisticated which is salubrious to animal life. The former, when uncombined, destroys life immediately, the latter therefore is the “*pabulum vitæ.*”

Its qualities are those of supporting life and flame in the most active state; and they both produce the same effect of changing it to phlogisticated air. This change is probably effected by the absorption of some component and important part of the air: and the part absorbed is undoubtedly the fluid before mentioned, as the animating principle of all organized matter. For air which has been frequently respired is no longer able to support light or flame, or to afford electricity, or support life in so great a degree as before. Another proof of the absorption is, that the blood undergoes a material change both of colour and consistence, during respiration. From being thick, and of a dark black, it becomes thin, and of a bright florid colour. This fact I have never known satisfactorily explained. Doctor Edmund Goodwin, in a very ingenious treatise on respiration, explains its use in these words: “that the chymical change

which the blood undergoes in respiration, gives a stimulating quality by which it is fitted to excite the left auricle and ventricle to contraction." But if the contraction of the left auricle and ventricle depends on this quality of the blood, what stimulates the right? The blood has lost that property, when it arrives at the right side of the heart; and is it not absurd to suppose that one side of the viscus acts from a different cause, and independent of the other? A more probable explanation is, that the change depends on the absorption of the animating principle, which although it is not the cause of the motion of the left auricle and ventricle, yet from its stimulating quality, it may excite this part of the heart to a stronger action, and enable it to throw the blood to the extreme parts of the body. Another phenomenon in support of this doctrine, is the connexion between the brain and lungs in respiration. An alternate motion of the two viscera is very evident. When the lungs inspire, the brain is depressed; when they expire it is elevated. Physiologists have attempted an explanation of this appearance, on the idea "that in expiration there is a stoppage of the circulation in the

lungs, which extends to the right ventricle, auricle, and venæ cavæ, producing a regurgitation of the blood in the vena cava descendens; whilst at the same time the arteries of the brain continue to act, and empty their contents into the sinuses, producing a swelling of the sinuses and consequently of the brain." Were this the case, the swelling of the sinuses would be more apparent, than the other parts; but it is the whole volume of the brain which swells. Besides the sinuses lie external of the brain, and their turgescence would more naturally depress, than elevate that viscus. Would not the passing of the fluid from the lungs to the brain more reasonably account for this phenomenon? In inspiration it is absorbed, in expiration it passes to its receptacle.

EXPERIENCE likewise, in the effects of different airs on our feelings, will afford strong arguments for these propositions. The clear unclouded atmosphere, or that in which electricity can be best collected, produces hilarity of spirits, freeness of respiration, and strength of motion. Hence the more vigorous and healthy body of the inhabitant of elevated lands, than of him

who lives on low grounds, in the neighbourhood of marshes : and hence our better feelings after the more equal distribution of the fluid by a thunder storm. That damp, stagnant air, in which electricity can scarcely be excited, produces lassitude, and weakness both of body and mind; and is the most fruitful cause and promoter of disease. In a still worse state of the atmosphere, or that in which the fluid becomes inactive, and ceases to vibrate as in the stagnant air of a confined dungeon, or cistern, animal life ceases immediately. But a \* man may live a fort-

\* Frequent instances occur in disease, as in fevers, of persons living much longer without food; and sometimes in health. One case in particular I will relate of a sea captain, who recounted the story himself to me, and proved it by a witness. He was at sea, his provisions were exhausted, and his vessel a wreck; and in that situation, he lived thirty seven days without a morsel of food, and the greater part of the time labouring at the pump: but there were three things in his favour. In the first place he was continually wet, and consequently the absorption of the moisture replenished his vessels. Secondly, he was constantly chewing a piece of lead, which must have kept his salivary organs in action, and as he swallowed his saliva, prevented in a degree, that uneasy sensation called hunger. And the third favourable circumstance was, that he was very fat.

The adipose membrane when loaded with fat, I conceive to be a storehouse of nourishment; but no person can suppose that it would afford a nervous fluid!!!

night, and even longer, without food, if he has pure atmospherick air to breathe: a conclusive proof, that the animating principle is not introduced in the food, but from the air.

THE fact of its absorption being established, it is easy to conduct it to the brain. From its great volatility it will ascend, in greater quantities than it will descend, and when it has arrived at the brain, there is no need of a secretion, for it is an essential unalterable fluid, and passes immediately into that viscus as being the best conductor for it.

THE brain then is the great receptacle of the animating principle. It is the reservoir from which every part is supplied for sensation and motion. This viscus is divided into two substances, the cortical and medullary. The medullary is the conducting part: it receives, and contains the fluid, and communicates it to the nerves, which are composed of the same substance. The cortical is probably the non-conducting part, and is perhaps the seat of the mind,

which receives the impressions in sensation, and of the will which directs the fluid in the voluntary motions. Hence the cortical is internal through the long tract of the medulla spinalis. The nerves are medullary conducting cords which allow the fluid to flow constantly to the vital organs, and when the will determines, to the voluntary organs; they are likewise the medium of sensation.

SENSATION and motion, although performed by the same fluid, differ in this respect. In sensation, the fluid flows to the sensorium; in motion, from it. This requires explanation. The nerves, when in a state of health, and when not acted upon by the will or external objects, are full of this fluid in an inactive state, but ready to vibrate from the least impression. Therefore, if the fluid in the air is put in an active state of vibration by the concussions of a sonorous body, this vibration by the organization of the ear is communicated to the fluid in the auditory nerve, which transmits it to the brain, and the sensation of hearing is produced. Again, when the fluid

in the air is put in vibration by the great luminary, and these vibrations are reflected by any object on the optick nerve, it produces the sensation of seeing that object. In the same manner may feeling and tasting be explained, by the immediate contact of a body producing vibration. Thus much for sensation. Motion is effected by the flow of the fluid from the brain to the moving parts. Into the vital organs the flow is continual. There is a flow into the voluntary, when in a state of health by the direction of the will; which when it determines a muscle to act, allows the fluid to undulate towards, and flow into it. The fluid, if the same that exists universally, called fire and electricity, which I have endeavoured to establish, is highly stimulant. A muscle is known to possess a great degree of excitability. And therefore the stimulant action of the fluid, upon the excitability of the muscle, must necessarily produce contraction and consequently motion.

THUS I have endeavoured to establish the universality and simplicity of an animating principle; that it exists in greatest quantity

in the air; and that it is absorbed from the air by the lungs, and then becomes the vital energy of the animal. This undoubtedly is the seat of that disease, which is the subject of this discourse; and according to the introductory arrangement, I shall next proceed to consider its

## NATURE.

“TOTIUS FERÉ CORPORIS RIGIDITAS SPASTICA.”

BUT previous to entering on a consideration of this division, it would be proper to attend to its nosological arrangement. Doctor Cullen in his nosology, has placed it in the class of neuroses, under the order of spasmi. He distinguishes it into two genera, tetanus, and trismus; each of which he subdivides into species the former denominated opisthotonos, episthotonos, and lateralis; the latter into traumaticus, and nascentium. But here, with due submission to his eminent character, and the celebrity of his work now in question, I think the learned doctor confounds genera with species, and produces a confusion which rather darkens, than elucidates the subject. Te-

tanus undoubtedly is a proper generick distinction, and as a “spastick rigidity of the body,” applies equally to that disease which arises from puncture, and that which arises from cold. But as they are specifically different, both in respect to their cause and cure, as will be shown, they ought to be considered as distinct species. But Doctor Cullen confounds them under a distinct genus of trismus, and species of traumaticus. In his elements of the theory and practice of physick, instead of these numerous divisions, he has taken the simple title tetanus, and makes the genus trismus, and all the species of the two genera, varieties only of this one genus. But with deference, I suspect, that in the former work too complex, in the latter too simple, he equally errs. The locking of the jaw, the opisthotonos, the episthotonos, and the lateralis undoubtedly are varieties only of the same disease. But to confound that species which arises from cold, that from puncture, and that which is proper to infants, is departing from the plan of a nosological arrangement, founded on specific differences. I should therefore think it more proper to have but

one genus, tetanus, and three species, viz. a punctura, a frigore, and nascentium.

THE tetanus a punctura is the subject of this dissertation, and its nature is now to be examined. This is clearly spasmodick. But it is a term which requires explanation. Spasm is an unequal, and morbid flow of the animating principle uncontrolled by the will; so that some muscles are more largely supplied than others: hence, the balance is destroyed, and unequal motion is produced.

### CAUSE.

I shall not, as usual, distinguish and describe the various predisponent, exciting, remote, and proximate causes. If I can discover one simple cause, and trace its manner of acting in producing such terrible effects, I shall think it sufficient. That species now under consideration, I believe invariably arises from the lesion of a nerve, or tendon, most commonly from puncture. The wounding instrument, a nail for instance, disarranges the exquisite texture of the nerve, or tendon. If suppuration could

take place, it would probably remove the offending cause. But there are two obstacles to this process. The wound of the integuments is not sufficient to produce suppuration ; and it consequently heals by the first intention. Again, there is not sensible heat, nor fluid enough in the nerve, to produce it of itself. As the offending cause cannot be removed by the usual means of suppuration, it remains, and continues to act. The disease is now upon the nerve, and it is a disarrangement of the texture of the nerve, from the stimulus of the cause. This disarrangement impedes the vibration of the animating fluid, and in fact makes the nerve a non-conductor. As the cause remains, the effects increase, and the disarrangement of texture insidiously creeps along the course of the nerve, until it affects that whole system of nerves. What I mean by "that system of nerves," is all the nerves of the same species. If it is a nerve which goes to a flexor muscle, all the nerves that pass to flexor muscles are affected in the same way. The usual term for the appearance of the disease is ten or twelve days ; but it varies in various ha-

bits, and from various causes. The most fruitful source of it is the wound of a flexor nerve, or tendon in the bottom of the foot, or palm of the hand. An explanation of this variety, I presume, will apply to all the others.

### EFFECTS.

IN describing its effects, I shall give a concise history of the disease; and as the symptoms will appear so decided as to allow of no possible mistake in the diagnosis, and as unfortunately our prognosis must be always unfavourable, I think it unnecessary to be particular on those branches of medical science,

THE vibration and circulation of the fluid being impeded in the flexor nerves, and propagated to the brain, the extensor muscles will be more largely supplied with the animating principle. Hence an inequality, and hence the spasm. It commonly makes its appearance by first affecting the extensor muscles nearest the sensorium. The first symptom of complaint is usually a slight stiffness of the neck, make-

ing it difficult for the patient to turn his head. The jaw next stiffens, the neck becomes rigid, and there is some difficulty of deglutition. The spasm now extends down the spine, recurvating the back as far as possible. The muscles of the extremities next become spasmodick, rigidly extending them. These symptoms are too violent to be constant; and they commonly remit, only, to return with redoubled violence. In this case of remission, they originate from the scrobiculus cordis, shooting back to the spine, and then becoming general. This symptom is considered as pathognomonick of the disease. The sphincters of the excretories are likewise affected in the latter part of the disorder. Sometimes in a remission, when the jaw is relaxed, a sudden spasm takes the protrusive muscles of the tongue, thrusts it out, and before it can be returned, the jaw flies too, and wounds it in a most shocking manner. The patient is now in so irritable a situation, that he cannot drink, speak, or move without exciting most violent spasms. And what greatly aggravates the disease, is, that the appetite is good,

without the power of taking food; and the reason unimpaired, and sensibility rather increased: so that the patient is fully sensible of his miserable situation, and inevitable fate. In this stage of the disorder, the extremities are obstinately extended, the back recurvated, the jaw locked, deglutition destroyed, the forehead wrinkled, the nose drawn up, and the cheeks back, exhibiting a countenance most frightfully distressing, by some called the *risus sardonius*. As yet it has affected only the muscles of voluntary motion. But now the vital parts are in danger. Respiration is performed with difficulty; the pulse exhibits symptoms of a spasmodick affection on the arterial system; and if the disease is not soon checked in its course, an obstinate spasm takes some vital organ, the heart for instance, and death immediately ensues. In this last stage of the disease, the brain exhibits appearances of the same nature as was supposed to exist on the nerves; and the same destruction of the texture of the nerve, has extended to the \* brain, become

\* This I think is proved by a case under my own observation, which I will relate. I once examined the brain of

universal, and completely destroyed its organization, and function.

THIS is the course which the disease usually takes; but there are many varieties, as I have before observed. Sometimes the patient is bent forwards, when it is denominated opisthotonos; sometimes sideways, when it is called lateralis; and not unfrequently the spasm is of the clonick nature. These however are no specifick alterations of the disorder. The peculiarities are, that it is unattended with fever, disarrangement of reason, or loss of appetite. But these are easily accounted for. The spasm exists only on the voluntary functions; the vital are uninjured until the last stage, which is by far the shortest.

THUS much for its seat, nature, cause and effects. Its cure will now be attended

a person who died of this disorder. The vessels were crowded with blood; so that in a transverse section of the brain, which naturally would exhibit nothing but the cortical and medullary substances uncoloured, in this case, discovered an immense number of little red points, like the extremities of small arteries. The texture of the brain likewise was destroyed, so that the organized parts were scarcely discernible; and in fact the whole appeared to be in a state of complete solution.

to, which is by far the most important, by far the most inexplicable.

## CURE.

VARIOUS theorists, and various practitioners have adopted various plans of treatment. But in no case except one, which I have seen, heard, or read of, where the disease arose from puncture, and the jaw had become locked, have I ever known it to be cured. And although in the great number of practical papers preserved in medical commentaries, we find the virtues of particular remedies highly extolled for the cure of this disease; yet, when we read the histories, we do not find a confirmed case of the tetanus a punctura cured by these medicines. The profession, however, generally agree in this one indication, to produce a suppuration in the first instance, by an incision in the wounded part. This undoubtedly is the most effectual; for by freely laying open the punctured part, the injured nerve is enabled, and solicited, to throw off the irritating injury, and recover its tone. Some, at the approach of the dis-

case, have tried the \* same expedient, but with little success: for until the suppuration takes place, it is only adding a fresh irritation to the one already existing; and when it does suppurate, the disease is commonly too far advanced to yield to a topical remedy. Others more bold have amputated the part above the injury. This is striking more at the root. The seat of irritation is removed at once; and if the disease has not yet become general, if there is sufficient vigour in the system, which is assisted by medicine, the balance may be restored.

MERCURY, the cold bath, the warm bath, bark, and opium have all been in repute, and all failed. The introduction of † mercury for the cure of this disease, probably was more for experiment, than for any antispasmodick quality which it possesses. It was therefore first tried in the West Indies, in that species which arises from cold and

\* In two cases in which I have known this method tried, it has failed.

† Recommended by Dr. Donald Monro in the Edinburgh physical and literary essays.

is very frequent and fatal among the negroes, in which its evacuant, and diaphoretick qualities were very serviceable. But as this is not the species now under consideration, and as in the tetanus from puncture, it has had frequent and fair trials without success, no further attention will be paid to it. The cold bath is highly extolled by Doctor James Curry \* in the memoirs of the London Medical Society: but he acknowledges, that out of seven cases, two only were assisted by it; and in these two, the disease did not arise from the injury of a nerve, or tendon, but from cold; therefore it is inapplicable. The warm bath undoubtedly is a palliative, but too inefficacious to remove the complaint. The bark, with the assistance of wine and other stimuli, has been warmly recommended by Doctor Benjamin Rush of Philadelphia, who with his usual ingenuity, supposes that relaxation is the predisponent, and a want of inflammation in the wounded part, is the proximate cause of the disease. Stimulants therefore, both exter-

\* Vol. III.

nal and internal, he thinks a fure remedy. Of the \* three cafes which he relates, I do not think a conclufive argument can be drawn in favour of the remedy. The firft arofe from a gunshot wound, which as there muft have been a large furface expofed, and probably a fuppuration, I do not conceive to be near fo dangerous. However, it is to be noted, that bliftering, and mercury were ufed at the fame time, which perhaps are entitled to as much merit as the bark, at leaft it leaves room for indecifion. The fecond related arofe from cold, and is therefore foreign from our fubject. And the third certainly cannot be confidered as a tetanus, for the complaints came on the day after the injury, when the wound was painful, and in a recent ftate, fo that dilating it procured relief.

WE next come to the confideration of opium. This excellent medicine has by many been extolled as the moft efficacious

+ Memoirs of the London medical fociety. vol. I. These are the only obfervations which I have ever feen of of Doctor Ruff's, on this difeafe. Perhaps further obfervation may have eftablifhed or altered his opinion.

in the cure of this disease. It is the remedy Doctor Cullen chiefly depends upon; and it has undoubtedly sometimes checked an approaching tetanus, but it more frequently fails. Whether it acts as a stimulant or sedative, is left to the enthusiasts of the contending systems to dispute upon. But the probability is, that it acts first as a stimulant, afterwards as a sedative; and its effects will prove the proposition. If it is given in small quantities, the symptoms increase; and even if the dose is sufficiently large, its first operation evidently increases the spasms; and it is always observable, that unless it produces a remission, the disease is aggravated. But when it does procure relief, the usual sedative effects appear. When used therefore, it ought to be given in such quantities, as to procure speedy relief, and repeated so frequently, as to prevent a return of the spasms. But when the disease is fixed, it most frequently, and I believe always fails.

THESE are the most important medicines that have been used in this disease, of which opium undoubtedly has the pre-eminence,

but I doubt whether either of them deserve much confidence. We have a remarkable \* case in the memoirs of the American academy of arts and sciences, ably related by a gentleman who strictly attended to it. In this case all the before mentioned medicines were used, and what is singular, all with palliative, but none with permanent effects.

THE mode of treatment most probable to succeed would be, it is generally agreed, in the first instance or at the time of puncture, if it is suspected that a tendon or nerve is injured, freely to lay open the part, and apply fomentations and cataplasms, to solicit a suppuration. But if this is neglected and the disease comes on, at the first approach of the symptoms, the part should be amputated. If it is only a toe or finger, it may be done without much deformity. But even if it is a large extremity which is wounded, when it is decidedly the disease, † amputation ought not to be deferred. I

\* The case of Dr. Edmund Wyer, related by Aaron Dexter, M. D. in vol II.

† I have seen this succeed in two instances, one from puncture when the spasms had already seized the neck, jaw, and pharynx: the other a tetanick diathesis from denuded tendons.

would suggest, whether if a stream of electricity could be kept passing through those nerves which are diseased, or non-conductors, it would not be serviceable. But the medicine most to be depended upon, is tobacco. It has succeeded in one case; and from its nature and effect in that, it bids fair to produce the most certain relief; and if there is a specifick, to be the one. Writers on the materia medica have given it the qualities of being highly stimulant, anodyne, and narcotick. Its eminent qualities in relieving that most obstinate spasm of the abdominal ring, which embraces the intestine in the hernia is a high recommendation of its antispasmodick virtues. Its first action, when introduced into the system, is highly stimulant; but its transition is almost immediate to being extremely debilitant. Its action is chiefly on the voluntary functions; and without affecting the mind as spirit or opium, it produces universal relaxation, and prostration of strength. So powerful is it, that a small leaf of tobacco dipped in spirit, and applied to the surface of the body, is attended with the most debilitating effects. Thus the most emi-

ment quality of tobacco is antispasmodick; and if it can be rendered probable, that its effects are similar on the disease in question, I hope at least it will operate as a hint for a further trial. Although new propositions may be supported by arguments, yet fact alone will establish them. I shall therefore endeavour to corroborate this plan of treatment, by the relation of a case to which I strictly attended.

## HISTORY.

A GIRL, nine years old, ran a nail into her foot, just over the flexor tendon of the second toe. In twelve days she complained of a stiff-neck and jaw, and difficulty of swallowing. She was likewise observed frequently to fall backwards. As the cause was then unknown, and the symptoms indefinitely described, it was attributed to worms, which she had before been troubled with. Accordingly a cathartic of rhubarb, and calomel was prescribed. The next day, the spasms were more fixed, and she was unable to sit up. In this situ-

ation she was visited by a gentleman of the first eminence, who immediately and decidedly declared it to be a tetanus. He advised opium to be given in large and frequent doses. Her neck had now become very rigid, her jaw quite stiff, and she was bent back as far as possible. The opium was given three days with unremitting attention. At first it gave a little relief, relaxed the spasms, and procured rest. But it soon became less and less efficacious, until she would take a dose \* sufficient to conquer the stoutest man without the least favourable effect. On the fifth day, she was in a state of the most obstinate rigidity; her forehead wrinkled, her cheeks drawn back to her ears, exhibiting a most distressing countenance, her neck firmly drawn back, her back recurvated, her limbs extended, and deglutition destroyed. She had taken no nourishment for four days, nor evacuated either urine or fœces. She had likewise the true pathognomonic symptom of the exacerbation of the spasm from the scrobiculus cordis: and the least exertion either to speak, swallow, or move, or

\* Sixty drops of liquid laudanum every three hours.

even the most trifling noise in the room, produced violent spasms. In this stage of the disorder, she was immersed in the warm bath, which produced so great relaxation, that she drank freely, passed her urine, and evacuated her fœces. Although the warm bath was so serviceable whilst in use, yet when out of it, the spasms returned with redoubled violence. This however was used two days, until it was found likewise to have become perfectly inefficacious. In this situation she must undoubtedly soon have been lost, had it not have been suggested by the gentleman before mentioned, my honoured preceptor, to try tobacco. From its nature and effect on the healthy subject, we judged it would be useful. Owing to indisposition, he was unable to attend to it himself, but advised me to make a fair experiment. To administer it by the mouth was impossible, for the power of deglutition was destroyed. I therefore made a \* strong decoction and injected it into the rectum. Never did I watch the operation of a medicine with more anxiety, and never did I see

\* Two ounces of tobacco simmered in a half pint of water.

success with more satisfaction. For a few moments after injection, there was an exacerbation of the spasms; but very soon a favourable change was observed, and they vanished almost entirely for twelve hours: at which period the enema was repeated with the like, though more permanent success. After repeating it four times in the space of forty eight hours, she was perfectly free from all spasmodick affections, and no complaint remained but debility, and a voracious appetite.

IN every doctrine which respects the health of man, candour and the love of truth oblige us to relate, as well the facts which militate against it, as those which support it. I shall therefore mention a case in which the use of tobacco was apparently injurious. Since writing the preceding pages, I was invited to see a black man, who was in the last stage of a tetanus; the cause of which was, probably, a liquid caustick applied to a carious tooth. The disease had appeared at the usual time, been treated in the usual way, yet increased with the most violent rapidity. It was the

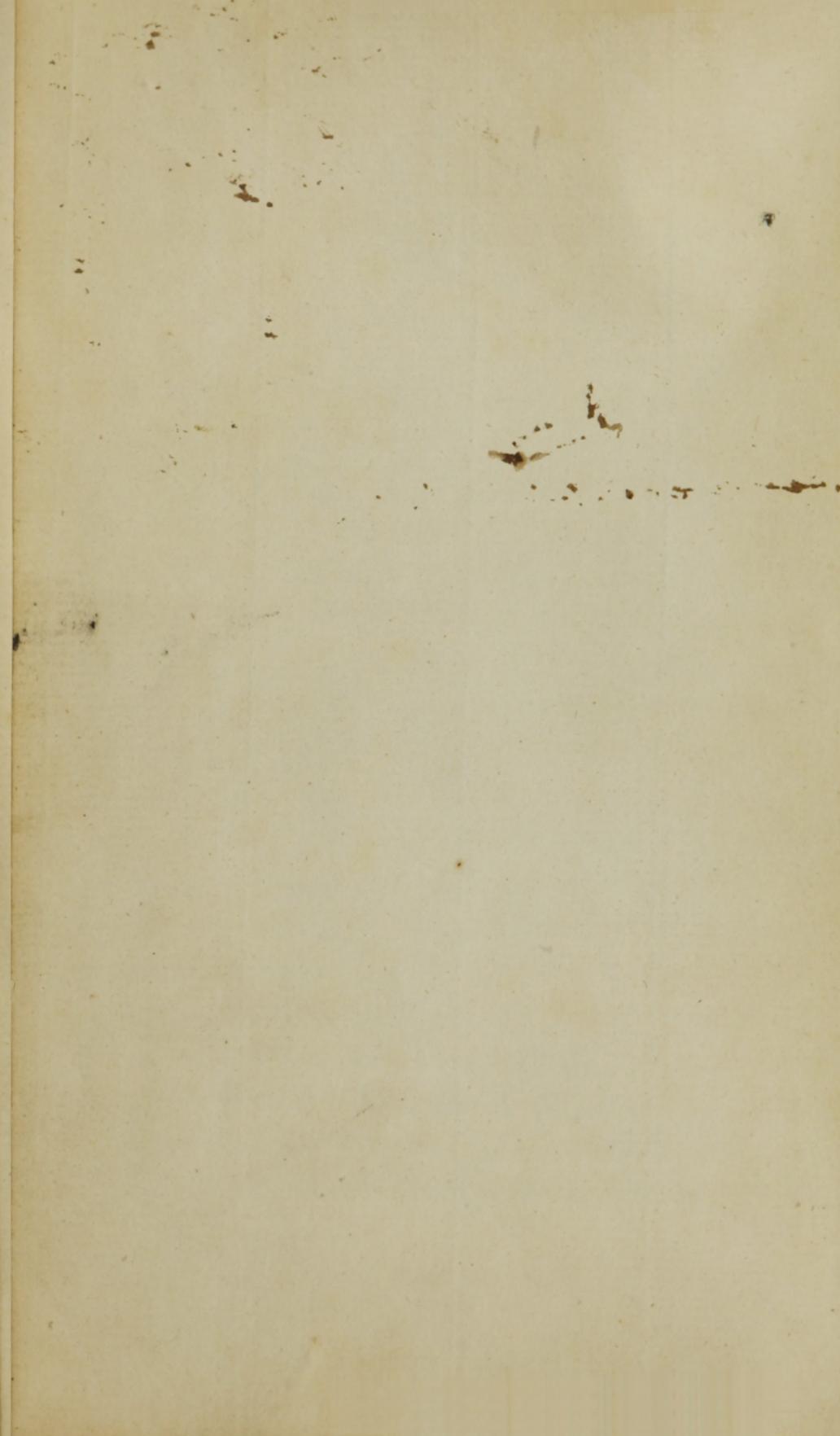
fourth day when I saw him. The risus sardonius, the recurvated spine, extended limbs, destroyed deglutition, an obstinate spasm on the sphincters, and the origin of the spasms from the scrobiculus cordis, indicated the thorough possession which it had taken of the voluntary organs: but the convulsed respiration, and the spasmodick pulse more strongly indicated approaching dissolution. His \* physician said he considered him as completely dead, as if his pulse had ceased to vibrate. I mentioned tobacco, which, although he had tried it the night before without success, he thought most promising, and therefore directed a strong decoction to be made, and administered in the form of an enema; and I tarried to attend to its operation. It immediately increased the spasms, respiration became extremely laborious, the pulse quick, irregular, and spasmodick, and in about half an hour, a spasm seized his heart, even whilst I was feeling his pulse, and death ensued. I immediately extracted the tooth, found the carious cavity crouded full of lint, the

\* Doctor Whipple.

surface of the cavity of a black appearance, and the enamel destroyed round its edges.

IN this case the first, or stimulant effect of the tobacco, was evidently too much for the patient; and he sunk under the increase of the spasms. It ought not however to operate against it as a remedy, for these two reasons. In the first place, it was not used until the last stage of the disorder, when the spasms had seized the vital organs. The second reason, which to some perhaps who have not seen demonstrable proofs, may appear whimsical, is, that medicine, and disease do not have the same operation on black, as on the white species. I have seen, and heard in these people of so many instances of deception, where rational prognosticks were formed, and of the fallacy of medicine which in other cases had succeeded, that I am fully convinced of a material and essential difference of organization and constitution. These it is hoped will account for the ill-success of tobacco in this last case.

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