

A new physical system of astronomy : an attempt to explain the operations of the powers which impel the planets and comets to perform elliptical revolutions round the sun, and revolve on their own axis : in which, the physical system of Sir Isaac Newton, is examined, and presumed to be refuted ; to which is annexed, a physiological treatise ; in which the first stage of animation is considered, and the means shewn, by which circulation is performed in the first rudiments of the incipient animal, before the vessels are completely organized, &c.; ; together with an explanation of the general laws, by which the animal economy is governed ; and particularly, the mode whereby the operations of the vis medicatrix naturae, or the unassisted powers of nature, are exerted to obviate and cure disease ; also, successful methods of curing cancerous ulcers, the quartan ague, putrid fevers, stopping mortifications, and extracting frost, so as to leave the frozen member perfectly well / by Joseph Young, M.D. of New-York.

Contributors

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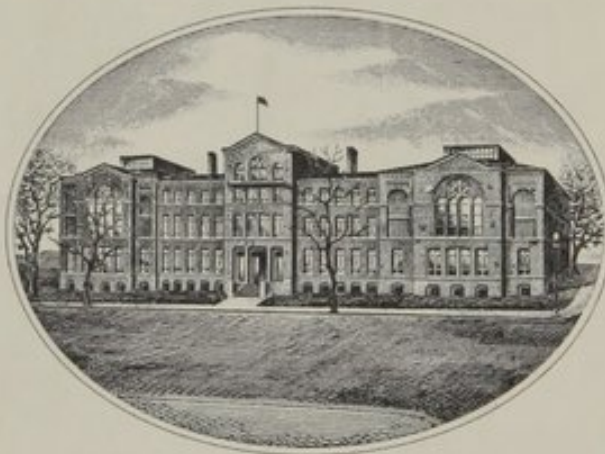
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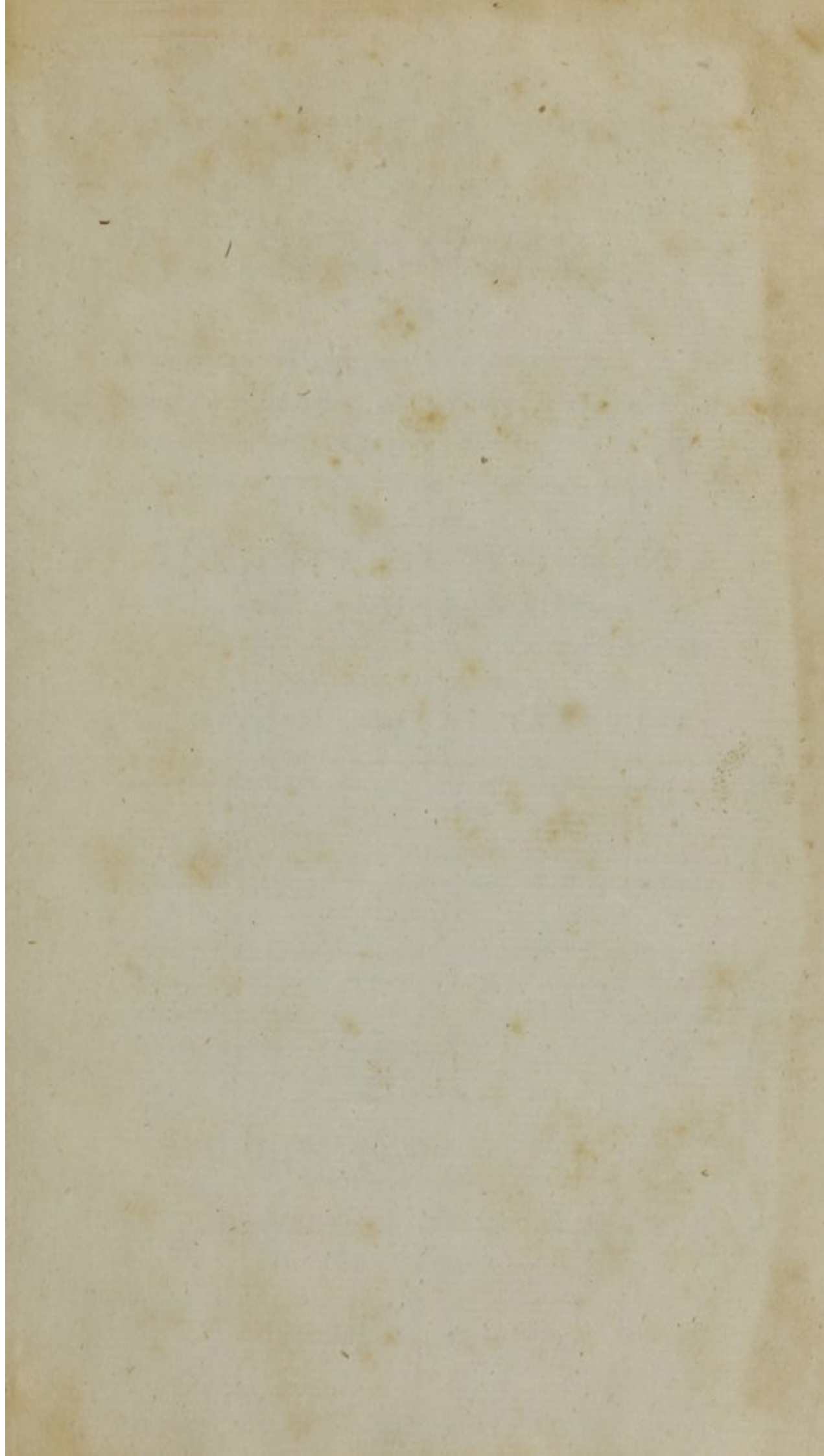
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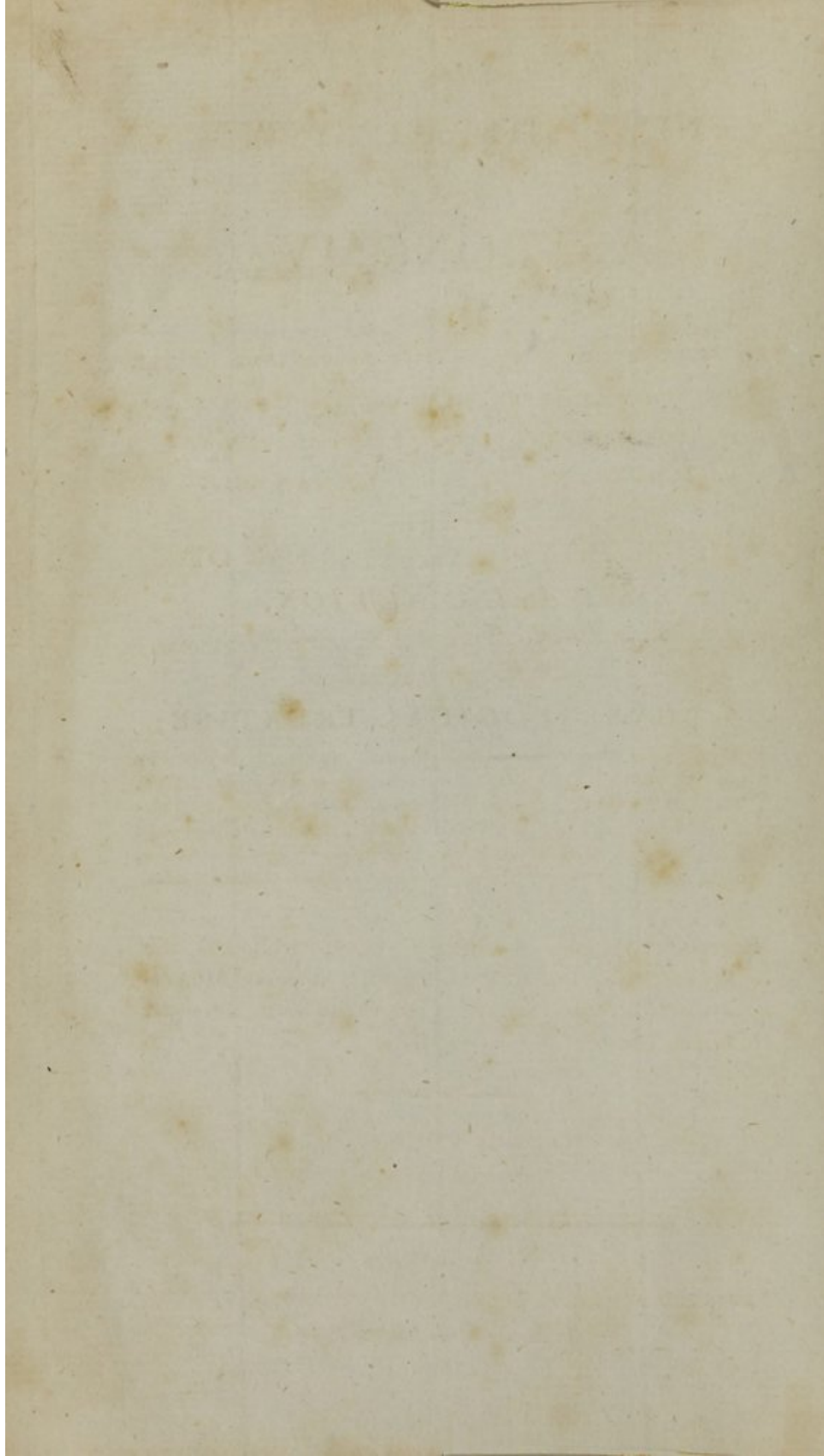
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A
NEW PHYSICAL SYSTEM
OF
ASTRONOMY;

OR,
AN ATTEMPT TO EXPLAIN THE OPERATIONS OF THE
POWERS WHICH IMPEL THE PLANETS AND COMETS TO
PERFORM ELIPTICAL REVOLUTIONS ROUND THE
SUN, AND REVOLVE ON THEIR OWN AXIS:

IN WHICH,
THE PHYSICAL SYSTEM OF
SIR ISAAC NEWTON,

IS EXAMINED, AND PRESUMED TO BE REFUTED.

TO WHICH IS ANNEXED,
A PHYSIOLOGICAL TREATISE;

In which the first Stage of Animation is considered, and the Means shewn, by which Circulation is performed in the first Rudiments of the incipient Animal, before the Vessels are completely organized, &c. Together with an Explanation of the general Laws, by which the Animal Economy is governed; and particularly, the Mode whereby the Operations of the *Vis Medicatrix Naturæ*, or the unassisted Powers of Nature, are exerted to obviate and cure Disease.

ALSO,
Successful Methods of curing CANCEROUS ULCERS, the
QUARTAN AGUE, PUTRID FEVERS, stopping MORTI-
FICATIONS, and extracting FROST, so as to leave the
frozen Member perfectly well.

BY JOSEPH YOUNG, M. D.
OF NEW-YORK.

NEW-YORK:

PRINTED BY GEO. F. HOPKINS, AT WASHINGTON'S HEAD,
NO. 84 MAIDEN-LANE,—1800.

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PREFACE,

TO THE TREATISE ON ASTRONOMY.

I HAVE always been astonished, when I observed that extreme degree of indolence, negligence, and want of curiosity, with which the greatest number of individuals, can slumber through the longest period of existence, and content themselves with slightly observing the changes and revolutions which succeed each other in our system, without endeavoring to investigate the cause, by which even the most common of these changes are produced.

THE active scenes through which I have passed, have not afforded me sufficient leisure, or opportunities for investigation ; but an invincible desire to be acquainted with the cause, as well as the effect, has in some degree supplied the deficiency. This propensity has grown with my growth, and strengthened with my strength ; and is now at the declining age of sixty-seven, as ardent as ever. It has always governed my pursuits, both in Philosophy and Physic ; the moment the fact was ascertained, I wished to know the cause ; I still blushed to give an opinion, for which I could not assign a good reason ; and as I have experienced so much pleasure, and advantage in this mode of proceeding, I hope it will plead my excuse, for recommending it so warmly to others.

I HAVE seldom been precipitate, or impatient in my pursuits ; but whenever any fact, or circumstance occurred, which promised to lead to the discovery of some useful truth, especially those relative to the laws and operations of nature ; these were held in view, until by future observations
and

and experiments, my expectations were either confirmed and gratified, by the attainment of the wished for discovery, or invalidated and relinquished.

BUT it frequently happens in these philosophic pursuits, as it formerly did with the Alchemists, who, although they never acquired the art of transmuting the baser metals into the more perfect or precious, yet they made discoveries of more real utility to mankind, than the one they were so eagerly in quest of, would have been, had they succeeded to the extent of their wishes ; as they improved Chymistry to a great degree.

IN like manner, an ingenious mechanic, by endeavoring to construct a perpetual motion of *solid matter*, without the assistance, or impulsive action of any fluid ; for although it is clearly impossible that he should succeed, he may nevertheless improve his knowledge in the mechanical powers, to a great degree.

IN all our pursuits, we should take nature for our guide ; and what the Deity has not done, we should never attempt to do. He has made a number of perpetual motions, and placed many of them in our view, which revolve regularly, and keep time very accurately, but all of them are impelled and actuated by fluids ; nor is it possible to produce one single instance, in which solids generate motion, independent of the action of fluids ; and I at present do not believe, that any pure, simple fluid, when fairly reduced to an absolute state of rest, can be the generative cause of motion, until it is either united with some other substance, or acted upon by friction, collision, or some substance in actual motion ; which is one reason amongst many others, that induces me to believe, that the electric fluid is a compound of pure elementary fire and oxygen, which in combination with the other parts of the air, flows into the poles of the sun, where it is decomposed, and the pure elementary fire, sent forth from the body of the sun, in rays of light, which
have

have not the properties of electricity, until they are united again with the oxygen, and then become an important instrument in the generation of motion : indeed, the very process of their decomposition, and re-uniting, is continually generating motion ; and as far as I can judge, it appears to be necessary that it should be frequently decomposed, as one smart thunder-storm, which evidently decomposes the lightning, seems entirely to change the atmosphere, which surrounds our earth. I well remember a thunder-storm, which happened in the month of June, in very sultry weather, which cleared and cooled the air to such a degree, that a severe frost ensued, which killed almost every tender vegetable. When I first perused the Copernican system, it gave me real pleasure ; as by it, phenomena are explained, and every appearance accounted for, in a rational manner. But when I came to peruse Sir Isaac Newton's Physical System, by which he endeavors to explain the cause of the revolutions of the planets and comets, by *projection* and *attraction*, I knew it to be chimerical ; and was positive, that their motions depended upon a strong, continued, uniform, impulsive power ; and supposed that power to be exerted by the electric fluid. But the first satisfactory evidence which I obtained of the real law or power, by which planetary revolutions are performed, arose from the observance of the circumstances which attend a comet, in its revolution round the sun : I could clearly perceive, that the atmosphere of the comet was excited into action, in its approach to the sun, and that it was powerfully repelled to the opposite side of the comet, both in descending to, and ascending from the sun ;—I therefore concluded that the comet was impelled towards the sun, in its descent, by the repulsive action of its atmospheric tail, against the elastic medium through which it passed ; by the same means, that impels a sky-rocket to move in a contrary direction to that in which the fire issues from its tail, against the elastic spring of the air.

AT this period, I knew but little of the laws and powers of electricity, until I perused the history, written by the celebrated

brated Doctor Priestly, on that subject. In the 232d and 401st pages of that valuable work, I found the whole mystery of what had been termed electrical attraction and repulsion, explained to my entire satisfaction ; by the result of a few simple experiments, that were made by Wilke and Epinus, which are delineated in figures 1, 2, 3 and 4, of this treatise, which I hope are executed in such a manner, as to convey my ideas with a sufficient degree of precision. As I write not to amuse the reader, but to promote fair discussion and investigation, I wish to be understood ; as I esteem the investigation of truth, to be the most pleasing, useful, and rational employment of the mind of man, as I also detest the wilful prostitution of the human faculties, to the propagation of error of any kind, as a most nefarious business.

IF the principles which I have adopted are well founded, I hope they will be improved to the advancement of useful knowledge ; but if they are false, I wish, that by detecting their fallacy, real principles may be discovered ; for principles are the guides, that must conduct us through the mysterious labyrinths of nature. And I am clearly convinced, that if one tenth part of the time had been employed, in investigating the real nature of things, by careful observation and experiment, and thereby to establish first principles, which has been spent in consulting the vague opinions of men, that science would have been in a state far advanced above what we find it at present.

FREEDOM delights to dwell in the habitations of knowledge, but flies from those of ignorance, as men avoid places infected with some noxious contagion. Knowledge gives an exalted relish to freedom, but adds a ten fold bitterness to the cup of slavery. It is therefore evident, that those who wish a permanent state of freedom, should endeavor to improve their knowledge, by every means in their power. And although the propagation of useful knowledge is the object of the author in publishing this work, yet he cannot deny

deny that he is anxious for the fate of his book, which he expects will be frequently prejudged, and condemned, upon a bare inspection of the title page ; especially when it is known that it was written by a native of America ; where nature has erroneously been supposed (by Mons. Buffon and Abbe Raynal) to *be-little* all her *productions*, and to have reduced the faculties of the human mind below the European standard of mediocrity.

A TREATISE

2

A
TREATISE
ON
ASTRONOMY.

The Hypothesis by which it is supposed that the Planets are actuated and governed by the Powers of Projection and Attraction, in their Annual Revolutions round the Sun, examined.

FROM the earliest stages of my life, that I can remember to have turned my thoughts to philosophic investigation, the doctrine of *attraction* appeared to me to be a most palpable absurdity. That solid bodies at some distance from each other; did, under certain circumstances, actuate each other, come together, and cohere to a degree that required some force to separate them, I knew to be a fact. But, then, the question occurred—Is it possible, that any mass of solid, insensible, unconscious matter can act and produce the most powerful effects where it is not? Can the sun, for instance, which is 95,173,000 miles distant from the earth, affect it by any supposed attractive influence? If it can affect this globe, at such an immense distance, must not this power be exerted by means of some *active effluvia*, sent out from the body of the sun with great velocity to the earth? Because the sun, as a body of solid matter, cannot act where it is not.—If, then, we sup-

pose its action to consist in the emission of an attractive effluvia, what powers of self-determination can inspire inanimate matter to change the direction of its own motion when it arrives at the earth? Or, by what means did it lay hold of, and arrest, a mass of solid matter of 7970 miles in diameter, flying, in a straight line, with an amazing projectile force, at the rate of 68,000 miles in an hour, which is above 140 times swifter than the motion of a cannon-ball, and force it to perform an elliptical revolution round the sun? But who can suppose such fluid incoherent matter as that which surrounds our globe, to be possessed of such strong attractive powers, as to check and restrain the prodigious projectile force of the earth, so as to prevent its escape from the solar system? But to increase our astonishment, we are told, that the planets move in a perfect vacuum; otherwise, the projectile force first impressed upon them would be lessened, and at length entirely destroyed, were they to move through a resisting medium. This, at once, renders the hypothesis superlatively incredible—to constitute *nothing*, a vinculum to connect such huge masses of matter together, and counteract, and overcome powers that appear to be almost invincible, which tend to separate them!—But the inconsistency does not end here; because, if there were such a vacuum, all the globes in our system would rush into it, until the powers of repulsion would be equally balanced.

It is pleasant enough, to hear a mason talk of building a chimney that can draw up smoke; and a pump-maker, that he can make a pump that can
draw

draw water from the bottom of a well thirty-three feet deep. But when I hear a grave philosopher ascribing the most powerful effects to a supposed attractive influence, inherent in fluid incoherent matter ; or, what is still more absurd, in a perfect vacuum, i. e. nothing at all ; I think it almost unpardonable !

BUT this is not all ; for we are told, that this attractive influence diminishes as the squares of the distance increase ; and yet it is by the influence of this diminished power that the superior planets are governed, and prevented from flying off and leaving our system altogether. But if the attractive influence of the sun is but barely sufficient to govern and counteract the projectile and centrifugal force of the earth, which is 1000 times less, and many millions of miles nearer to the sun than Saturn ; how can it be supposed, that his greatly diminished influence can restrain, actuate, and govern a mass of matter of 78,000 miles in diameter, moving at the rate of 22,101 miles in an hour, in his annual revolution round the sun ? Certainly the larger that bodies are, if they are of equal density, the greater will be their vis inertia ; and, when in motion, they will require stronger and more active powers to stop, restrain, and govern that motion, than would be necessary to actuate and govern smaller ones.

How would this doctrine apply in mechanics ? If philosophers had turned their attention to the phenomena of the tides, which they have supposed to be caused by the attractive influence of the sun and moon,

moon, they would have discovered the fallacy of this hypothesis, as the fact is in diametrical opposition to the principle; for, instead of the attractive influence of the moon being strongest, and raising the highest tides, where it is vertical over any point of the equator, it raises no tide at all. But this is invariably the case, whenever *attraction* should exert its greatest powers, we find it incapable of doing any thing. Thus, at the islands of Ascension and St. Matthew there are no tides at all, and but very small tides in the West-India islands; but the farther we go to the north and south of the equator on the Columbian coast, when the moon is in the meridian, the tides gradually increase in depth. We are, therefore, constrained to conclude, either that the moon has no attractive influence; or, that this *influence increases* as the *distance* of the object to be *attracted* is *increased*. On this principle we might assign a plausible reason, why the largest planets, which are placed at the greatest distance from the sun, where attraction, by the common hypothesis, is almost diminished to nothing, are, nevertheless, as powerfully restrained, governed and actuated as the smallest, that are much nearer to the supposed attracting body.

AGREEABLY to the hypothesis which supposes, that the planets, in their annual revolutions, are actuated and governed by the powers of projection and attraction, and that the powers of attraction diminish as the squares of the distance increase, the largest planets should have been placed nearest to the sun, and the smaller farthest off. Jupiter, which is more
than

than 2000 times larger, and 30 times more distant from the sun than Mercury, should change places with him.

BUT when we consider the amazing distance of the planet lately discovered by Herschell from the sun; its vast dimensions, and consequent vis inertia; and, when in motion, its prodigious centrifugal force, and compare it with the above given rule, I think we should be willing to relinquish the chimerical non-entity *attraction*, and endeavor to investigate the real laws of nature, which are adequate to the production of such astonishing effects.

IT is clearly impossible for matter to act where it is not, or to change the direction of its own motion, as it is for any substance which has no cohesion to drag any large body after it, which, besides its vis inertia, has a prodigious projectile force to overcome.

An Attempt to investigate and explain the Laws by which the
Planetary System is governed.

ORIGINAL fire is a pure, simple, indestructible element. It pervades all things, and is every where present, either in an active or quiescent state; and, by the infinity of combinations which it forms with other substances which are inert, it produces numberless varieties of compound bodies, very different in appearance and qualities. And, as it is the only
essential

essential fluid, or active matter, in this material system; whenever we observe any change in simple matter, or in compound bodies, such as are generally denominated attraction, repulsion, combination, or decomposition, we are to ascribe it to the operation of this universal agent, or rather instrument, in the hand of the Deity, by means of which he produces every revolution or change in this material system. Whenever one particle or mass of matter actuates another that is distant from it, it is by means of an atmosphere, which is more or less active as it is more or less electrical. For instance, the atmosphere of one planet may be purely electrical, and that of others clogged with various substances that are volatilized by heat, which will vary the power that will be necessary to actuate them. And it is very probable that the atmosphere of comets, and the planets which are most distant from the sun, are most electrical. There are two circumstances which convince me that this is the case: viz.

1st. BECAUSE Saturn, which is at such an immense distance, is nearly as bright as Venus. And 2dly, Because both Saturn and Jupiter are much larger than the other planets that are nearer to the sun, and consequently have more vis inertia, and, when in rapid motion, must require more active atmospheres to govern them.

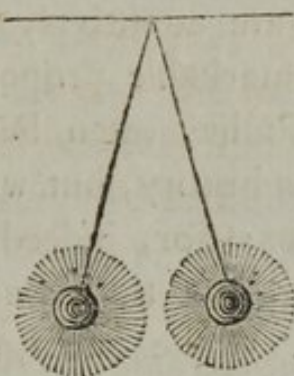
BUT as I will be better understood by explaining my first principles, I shall endeavor to render them as plain as I possibly can; as I am persuaded that nothing has created so much confusion in astronomy,
as

as making use of the term attraction, which has had as little meaning in language as existence in the nature of things.

1. EVERY separate mass of matter, however small it may be, is surrounded by an atmosphere proper to itself, by which means alone they become capable of either action or re-action.

2. ALL bodies possessing atmospheres of equal strength and proportion to their quantity of matter, will, when excited to an equal degree, repel each other to a certain distance.

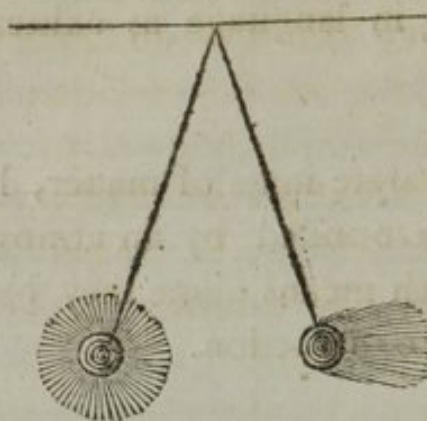
FIG. I.



3. BUT every stronger atmosphere, when excited to a proper degree, repels the weaker atmosphere of every other body, when brought within the sphere of each other's influence, to the most remote or opposite side of the body possessing the weakest atmosphere; where it assumes a form and power similar to the tail of a comet or sky-rocket; which, by increasing the elastic spring of the surrounding ether, and acting against it, with an increased degree of energy, forcibly impels the body to which it belongs in a direct line to the body possessed of the strongest atmosphere.

FIG.

FIG. II.



This phenomena is denominated appulsion, and is the occult cause of what has hitherto been called attraction. For a confirmation of this fact, see the 232 page of Dr. Priestley's History of Electricity. The passage alluded to is in the words following:—

“ But when they are attentively considered, they
 “ demonstrate a remarkable property of all electri-
 “ fied bodies, which has often been referred to in
 “ the course of this history, but which had not been
 “ attended to before; nor, indeed, do I apprehend
 “ it was fully understood till it was explained in all
 “ its extent by Mr. Wilke and Epinus. It is, that
 “ the electric fluid, when there is a redundancy of it
 “ in any body, repels the electric fluid in any other
 “ body, when they are brought within the sphere of
 “ each other's influence, and drives it into the remote
 “ parts of the body, or quite out of it, if there be
 “ any outlet for that purpose.” (See Fig. II.)

The above principle is also corroborated by a curious experiment made by Epinus, although it is clear that he did not understand it at the time he made it. It is recorded in page 401 of the celebrated Dr. Priestley's history in the following words, viz.—“ That if a metallic conductor and a cork ball
 “ be both electrified positively, so as to repel one
 “ another; yet, that if the ball be forcibly brought
 “ within

“ within two, three, or four lines of the conductor,
 “ it will be attracted by it, and be repelled again if
 “ it be forcibly pushed beyond that limit of attrac-
 “ tion. If the ball be confined to move within the
 “ same small distance, a moderate electrification of
 “ the conductor will repel the ball to its utmost limit;
 “ but a stronger electrification of the conductor will
 “ cause it to be attracted.”

The editor remarks, that this experiment deserves particular attention.

This experiment puzzled the electricians, because it contradicted their favourite maxim, that bodies possessing the same kind of electricity repel one another; for in this experiment he found the same ball, possessing the same electricity, both repelled and attracted. In the first case the ball was repelled, because it was not prevented from receding from the conductor; it preserved an uniform atmosphere, antagonized the atmosphere of the conductor, and pushed it off; (see Fig. III.) but when it was forcibly brought nearer to the conductor, the stronger atmosphere of the conductor repelled the weaker atmosphere to the opposite side of the ball, where acting like the tail of a comet, or sky-rocket, it impelled the ball to the conductor. (See Fig. IV.)

FIG. III.

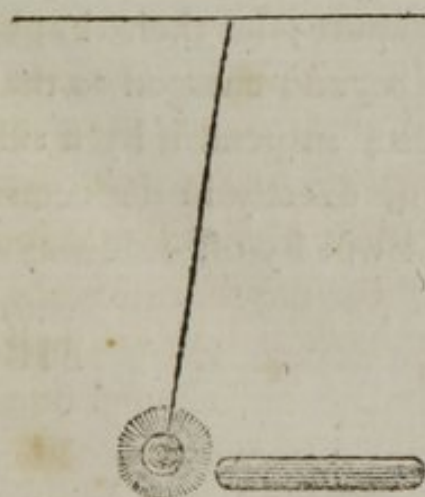
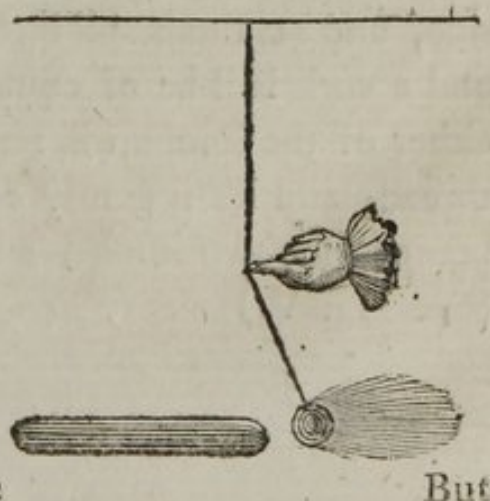


FIG. IV.



But here it may be proper to observe, That the atmospheres of bodies, act with more power upon each other, than they do on the solid matter of the bodies to which they respectively belong; because solid matter is inert, and cannot re-act.

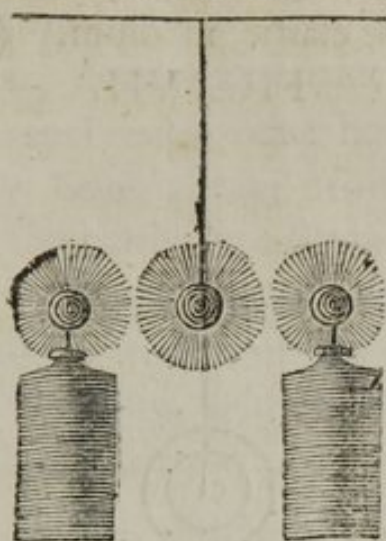
4. IF two bodies thus brought into contact are round, dry, and elastic, a sufficient quantity of atmospheric matter will be communicated by the strongest, to form an uniform atmosphere round that which was weakest, when they will repel each other again, as in Fig. I.

5. BUT when they are in this state of repulsion, if a sharp pointed wire be slowly presented to one of the balls, to draw off part of its atmosphere, the remaining part will be repelled to the opposite side of the body to which it belongs, as in Fig. II. which will impel it to the body which possessed the strongest atmosphere, in a direct line.

6. WHEN two atmospheres are repelling each other, if another body, possessing an atmosphere of equal strength, be let fall exactly between them, it will fly off side-ways. To make the experiment with the electric machine, charge two Leyden phials of equal size, and set them six inches apart; let their knobs and a cork ball be of equal size, and charged so that either of the knobs will repel it; suspend it by a silk thread, and let it gently down, exactly in the centre between the two knobs, and it will fly off side-ways. (See Fig. V.)

FIG.

FIG. V.



7. WHEN two hemispheres are brought together with their plane sides, so as to exclude the air, their atmospheres combining, will unite, surrounding both, and they will remain in contact. (See Fig. VI.) Flat

FIG. VI.



bodies often unite in the same manner, whenever they are brought into such close contact, as to exclude the air ; for as long as the air can insinuate itself between the two bodies, they will have separate atmospheres, and consequently repel each other. This is demonstrated by an experiment frequently made by boys, who, by passing a string through the upper part of a piece of wet leather, and applying it close to the surface of a stone, they will be so forcibly compressed to each other, by the surrounding atmosphere, as to enable the boy to carry off the stone, suspended by the small cord. This teaches us that water is often necessary in cementing bodies together

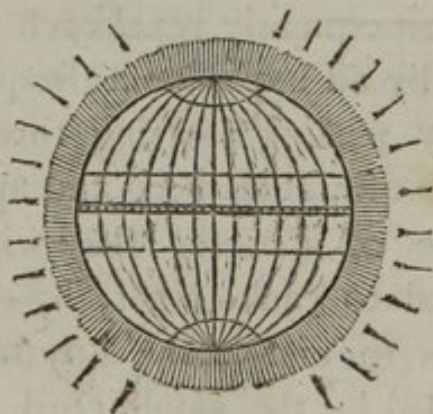
together, by filling up empty spaces and pores, and excluding a more elastic medium. (See Fig. VII.)

FIG. VII.



8. WHAT has been observed in the first and third propositions, will equally serve to explain the doctrine of gravitation; for the atmosphere of the earth being so much stronger than the atmosphere of any small body contained in it, it is plain that the atmosphere of the small body will be strongly propelled in a vertical direction, to form a tail, which, by its motion, will increase in strength and activity, by which means the motion of the falling body is accelerated. This is very obvious in the case of a comet approaching the sun. (See Fig. VIII.)

FIG. VIII.



9. ALL bodies included in the atmosphere of the earth, must be furnished with stronger or more active atmospheres than those they naturally possess, before they will repel each other horizontally; their natural quantity being always propelled, by the superior force of the earth's atmosphere, to the most vertical point of the small body, its action must be perpendicular to the centre of the earth, and therefore cannot act laterally, without an additional degree of strength and activity.

10. THE atmospheres of all bodies act with more power upon each other, than they do upon the inactive matter of which the body is composed, because inert matter is incapable of re-action, and being porous, is easily pervaded by the subtile matter, without opposition, which is the reason why the atmospheres of comets and planets, are propelled by the rays of the sun, to their opposite sides, where collecting in a conical form, whose depth is increased, and whose breadth is diminished, their powers of re-action are greatly augmented:—For example, if 20 men should attempt to cross a very rapid river four feet deep, one following the other at the distance of one foot, the current would easily carry them down. But if they only change their position, and form themselves into a line, extending up and down the stream, one would support the other, and not only prevent their being carried away, but even enable them to make head way against the current. That the solar system is actuated and governed by these laws, which I denominate *repulsion* and *appulsion*, or *action* and *re-action*, will appear evident by applying them to explain the cause of the tides.

It is undoubtedly difficult to eradicate the prejudices conceived in favor of opinions, that have been promulgated by men of the greatest abilities, and sanctioned by time, and almost universal consent; amongst which we may reckon the opinion that the tides are caused by an attractive influence of the sun and moon: but I presume little more will be necessary to demonstrate that they are caused by a direct contrary influence, than to attend to phenomena. (See Fig. IX.)

It is known to almost every seaman, that the tides are very considerable towards the poles; and scarcely perceptible at the equator, the coasts of Africa near the line, and at the mouth of the Mediterranean.—Now, if the common opinion was true, that the powers of attraction increase according to the squares of the distance, when the sun and moon acted in conjunction at the equator, they would raise a tide sufficient to deluge the Andes, and overwhelm the islands under the line, when their greatly diminished power of attraction, is yet sufficient to raise a tide of 30 feet deep at Whalebone Point, in north latitude 65 deg.—If, therefore, we suppose the attractive influence of the sun and moon, has sufficient power to draw the water from the polar regions, to raise a tide of 30 feet in 25 degrees, that is 14 inches in every degree, and this power increasing agreeably to the above given ratio, through the remaining sixty-five degrees, the poor Africans would have to bestride mount Atlas; and the Spaniards the highest summits of the Andes, to escape a second deluge; but if we only allow the power to proceed without increasing

increasing according to the squares of the distance, it would produce a tide at the island of St. Matthew in the Atlantic, of 105 feet deep. But, unfortunately for the *attractive* hypothesis, there never has been a tide of six inches deep, on the western coast of Africa, at the equator, since Noah's flood ; and but very small tides in the West-India islands.

FROM an impartial, attentive perusal of what has been said, I presume it must be *conceded*, that attraction has no influence in producing the tides. Let us next consider the power of repulsion and appulsion, or action and re-action.

THE earth being an oblate spheroid, that is, thirty-six miles more in diameter at the equator, than from pole to pole ; the waters are in consequence, raised eighteen miles higher at the equator, than is necessary to constitute a true globe, in which condition they are kept, by the centrifugal force of the earth, in its diurnal rotation on its axis. But as soon as the moon appears above the horizon, it acts upon the atmosphere of the earth, repelling it not only northward and southward, but to every point of the compass, between the poles : the superincumbent weight and spring of the atmosphere, acting upon the surface of the waters, sets them in motion, and gives them a western direction, forcing a considerable tide into the river Indus, and the strait of Babelmandel : but when the moon arrives at the meridian, the waters directly under it, will not be actuated as much by the direct rays of the moon's atmosphere, as by those diverging to the northward and southward ; and
although

although this power may be almost imperceptible at the equator, with only force enough to send off small waves, of the tenth of an inch high, yet as they recede from the line, they will get more and more from under the influence of the centrifugal force of the earth, which is much greater at the equator, than at any other place; they will go on accumulating until they become very considerable, and are invariably greater on the eastern coasts of Columbia, than on the western coasts of Africa and Europe, in the same parallel of latitude, because, the repulsive influence of the moon, acting on the waters of the ocean, from the time she appears above the horizon, until she arrives at the meridian, gives the motion of the tides a western direction, and causes the highest tides on the coasts of Columbia, and little or none, on the opposite shores, near the line.

IF any additional evidence were wanting to prove that the tides are caused by the powers of repulsion and appulsion, we have it in the tides which are forced round the northern end of the eastern continent, or through some passage between the Chinese sea and the Atlantic ocean, which reaches Aberdeen in Scotland, before the tide from the southward reaches London; and these contrary tides, meeting on the Labrador coasts and bay of Fundy, produce tides of an enormous depth. Something similar to this takes place in the Sound, as the tides are forced in, both at New-London and at the Hook.

BUT if any person wishes to have ocular demonstration, let him stand on the banks of the Hudson, when

when there should happen what is called a spring tide, a little after the moon has passed the meridian, and he will find the water flowing up the river towards Albany : it is demonstrable, that the waters are propelled to the northward and southward, by a repulsive influence of the sun and moon ; and that when they have passed, and cease to repel, the water flows back towards the equator, until it is repelled again by the same power. So far we have proceeded tolerably well ; but the most difficult question remains yet to be answered, to wit :—What causes the tides on the opposite side of the earth to correspond so exactly with those on this side ?

THIS must be explained, and that without hoops too ! otherwise, our whole fabric falls to the ground.

LET us then say, that the most dense and weighty part of the earth's atmosphere, is always in a point opposite to the centre of the repelling body, whether it be the sun or moon, or both acting in conjunction ; therefore the pressure is greatest on that part of the ocean, where the apex of the atmospherical cone is vertical, which produces the same effect on that side of the globe, by appulsion, as is produced on the other side by repulsion ; and this will continue to be the case, as long as *action* and *re-action* continue to be equal. By this means high tides are produced to the northward and southward, and little or none at the equator ; at which place they should be most considerable, agreeable to the Newtonian hypothesis of attraction.

THIS

THIS may be denominated, the doctrine of repulsion and appulsion, or of action and re-action ; and is the powerful means by which the Deity sets all the planetary orbs in motion, and governs and confines them to their proper spheres, at due distances from the sun, and from each other, proportioned to the quantity of matter, and quality of the atmosphere of each of them ; without the machinery of a whirling table, to prevent their flying off, out of the system.

AN attempt to investigate the laws by which the solar system is governed, and explain the causes of the annual elliptical revolution of the earth round the sun, and the diurnal rotation on its own axis.

As the sun is without doubt the *primum mobile*, or first mover of this stupendous system, it behoves us to investigate the means or powers by which *he* is actuated, and caused to perform a revolution on his axis once in 25 days and six hours. I shall, in the first place, give my opinion of this matter, and then corroborate my conjectures, with a recital of such experiments and observations, as the nature of the subject will admit of.—In the first place, I shall venture to assert, that the whole universe is full of elastic repulsive matter, denominated electricity, which is most probably composed of oxygen and caloric. When cold, it is more condensed and less active, and unites freely in the composition of many solid bodies, and remains for some time inactive ; but when acted upon by friction, collision, or heat, it immediately assumes its pristine qualities, and is the secondary cause of all the motion in the universe.—

IN

In the next place, I suppose the body of the sun, to consist of solid incombustible matter, formed in such a manner, as freely to admit the more condensed electric matter, (by which he is surrounded, and strongly compressed) to enter at his poles, into a large cavity in his centre, where being heated and expanded to the greatest possible degree, it is expelled with amazing velocity to the circumference, through numberless curving pores, (as in Fig. IX.) all uniformly bending westward from the centre. And as it is a known property of bodies in motion, and of the rays of light in particular, to move in straight lines, it is evident that the power of every particle of the igneous matter, exploded from the centre, through these curving pores, must be directed against, and exert their force upon the eastern sides of the canals through which they move; which causes the sun to revolve on his axis eastward. That this is an invariable law of nature, may be demonstrated by constructing a wheel on these principles, which may be actuated either by steam, electricity, common air, water, or fire.—It was only necessary for the omniscient architect to construct the sun, in some such manner, of such materials as would withstand the action of the fire; and, first, to give the internal cavity such a degree of heat, as to cause the explosive igneous matter, to move with great celerity, from the centre to the circumference of the globe; which impulse being at all times equal, as both the quantity and quality, of the combustible matter, with which he is supplied, is invariably the same; the periods of his revolutions, must also invariably be the same. And as he is continually pouring forth
oceans

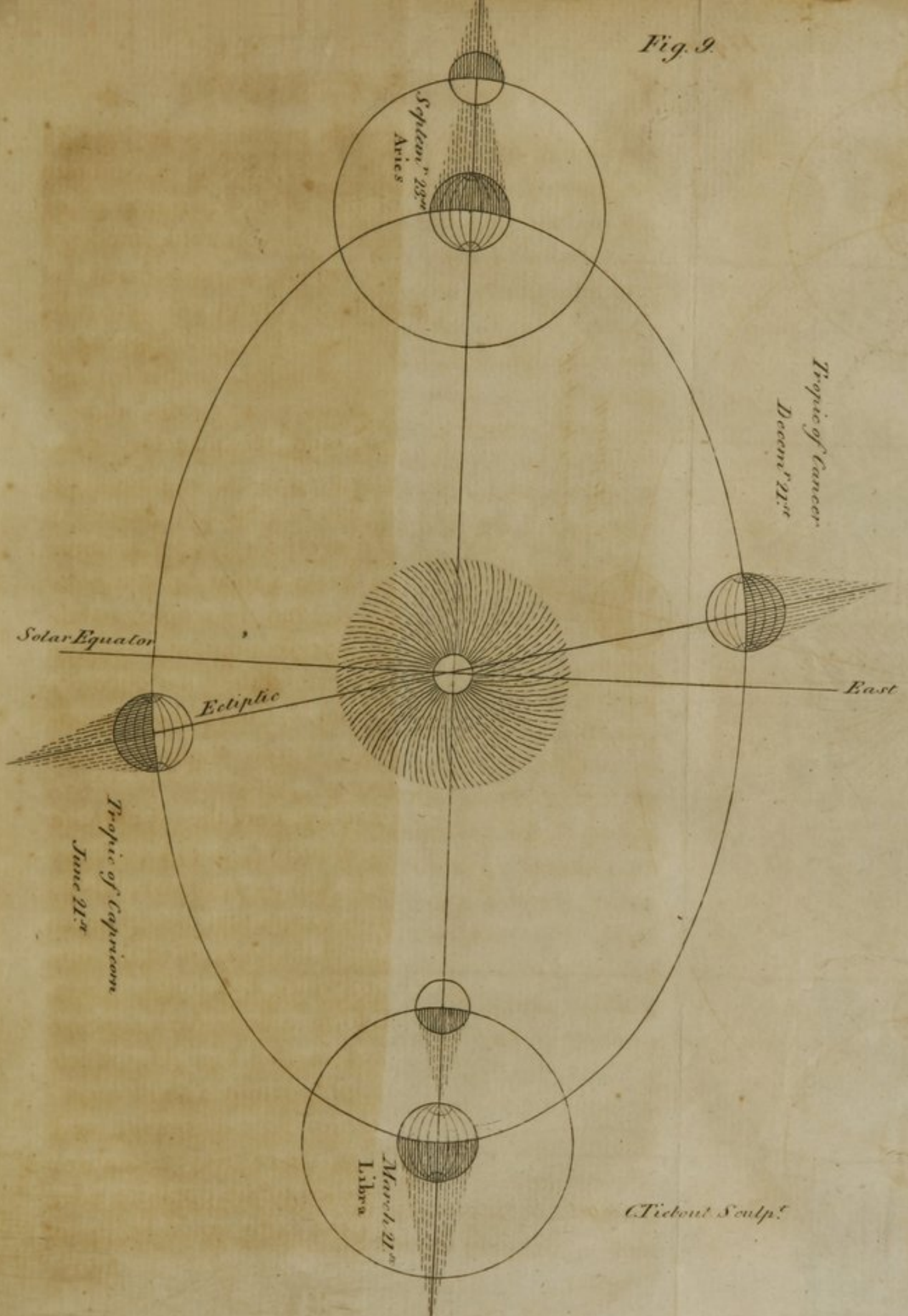
oceans of fire, from his equatorial and tropical regions, he must receive an adequate supply at his poles, of electric matter in a state of extreme cold and condensation, otherwise a perfect vacuum would succeed, and the sun be extinguished; and consequently light, life, heat and motion would cease, and be no more. The cold air flowing into an air furnace, may serve to convey some idea of this grand operation. But the chief objection to this hypothesis, arises from the difficulty of conceiving, how the sun can be supplied with a sufficient pabulum, to support such an immense waste of fire for ages, especially when this pabulum is said to consist only of the matters contained in the common air, while we daily experience the necessity of supplying our fires with fresh quantities of more substantial fuel, without which they are soon extinguished. But this objection will vanish, when we consider that matter is indestructible, that no being, except the one who created it, can annihilate one single particle of it: it may be decomposed, and recomposed millions of times, but the same quantity of matter still exists; consequently there is the same quantity of fire existing now, as at the creation, and no more.—Let those who find difficulty in conceiving by what means the cold condensed air, rushing impetuously into the poles of the sun, should be instantly converted into real active fire, and diffused through the regions of space, only consider, that the electric matter dispersed through the regions of our atmosphere, requires only rapid motion, to convert it into the most tremendously active fire, with which we are acquainted. And even the trifling quantity that we can collect
from

from the air, by means of our diminutive machines, is sufficient to teach us, how this grand operation is performed in the immense body of the sun, which is a mass of solid matter of 890,000 miles in diameter, heated throughout to the most intense degree, surrounded and strongly compressed, especially at his poles, with igneous matter in a condensed latent state, that only requires to be excited into rapid motion, to exhibit every appearance, and assume every quality of fire.—This operation may be termed the respiration of the sun; and if he should ever cease to respire, he will also cease to revolve, and be extinct: but when this matter is decomposed, by the violent heat and agitation in the body of the sun, and expelled with extreme velocity from his equatorial and tropical regions, the caloric forms rays which afford light, as long as they continue to move with great velocity, in straight lines; but cannot exhibit all the phenomena essential to fire, until it is again united to the oxygen, or some other acid gas. Among the many reasons which induce me to believe, that the body of the sun is composed of solid incombustible matter, are, first, That no permanent collection of atmospheric matter can subsist, without some solid body to attach itself to, because active repulsive matter, without such nucleus, would expand, and diffuse itself abroad, until it was equally distributed; and our system would be reduced to a condition, similar to that of an animal, deprived of both heart and lungs. Secondly, all pneumatick, aquatick and pyrotechnick machines, are composed of solid matter, which is in all cases passive, and are so constructed, as to be actuated by fluids, which are
in

in all cases the instruments in producing motion ; as there is no case, in which solids generate or continue motion, independent of the impulse or energy of fluids.—And were it not for this admirable mode of collecting such immense quantities of condensed latent igneous matter, rendered almost infinitely subtle, active and penetrating by heat, and diffusing it through space, to be recompounded, condensed and returned to the sun, in constant succession, all motion would soon be lost, and the planetary orbs would cease to revolve.

BUT as I wish to render my theory as perspicuous as I possibly can, I have drawn a solar equator over the sun's disk, (as in Fig. IX.) and the tropic's parallel to it, supposed at $23\frac{1}{2}$ degrees distant ; and the ecliptic from A to B, intersecting the solar equator, at the middle or vertical point. I have then supposed the earth laying entirely at rest, at the tropic of Capricorn on the 21st day of June, with its atmosphere perfectly still and inactive, until the rays of the sun, by their energy and influence, began to heat, rarify, agitate and render it actively repulsive, when, by a law already mentioned, to wit, that the strongest atmosphere will always repel the weakest to the opposite side of the body to which it belongs, where that of the earth, would form a long dark cone or tail, like that represented in the Fig. II. which would re-act, with a force proportioned to its quantity of matter, and degree of its excitement, and when a sufficient quantity of the earth's atmosphere had been excited and propelled to the opposite side, to overcome its vis inertia, the earth would begin to
move

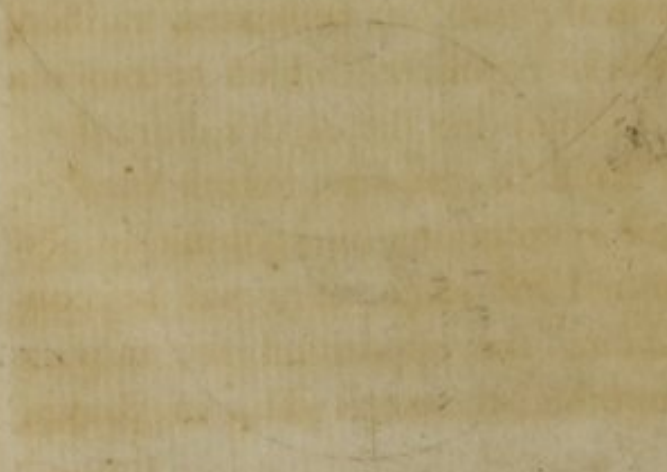
Fig. 9.



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move on slowly to the eastward, in the line of the ecliptic, most probably in a direct course to the centre of the sun; but as it gradually approached the solar equator, it became more exposed to the action of his direct rays, sent off in greater abundance, and with more velocity from his equatorial than his tropical regions, where the earth was supposed to begin its first revolution: in consequence of this increasing degree of heat, a greater quantity of the earth's atmosphere would be excited, and rendered more repulsively active, to re-act, and antagonize the vertical rays of the sun, (See Fig. I.) which prevents it from proceeding to the sun, and gradually propels it to a greater distance, accelerating its motion at the same time, until it arrives at that limit, where repulsion and appulsion are exactly equal, and where, by the opposite actions of these two powers, the earth is not only impelled in its annual circuit, (See Fig. V.) but also assisted in its diurnal revolution; for, as it must now move in a curve line, the resistance of the medium through which it passes, will bend its atmospheric cone back westward, condensing its eastern side, to the greatest degree, which will cause it to act with most power on that side of the earth, which is successively presenting a cold dense atmosphere to the sun, to be heated, rarified, and rendered actively repulsive; which becomes a powerful agent, in promoting the earth's diurnal rotation. As these impulsive powers, which were capable to begin these revolutions, are constantly acting with undiminished influence, they will be continued, notwithstanding the opposition the moving bodies may be supposed to meet with, in passing through

through a resisting medium : which it is impossible, that any projectile should do, let its original force be supposed to be the greatest possible.

FROM what has been premised, it is sufficiently evident, that the annual revolution of the earth round the sun must be elliptical ; because, in passing along the ecliptic, it must pass the centre of the sun twice every year, to wit, on the 21st of March and 22d of September, when it is propelled to the greatest distance, and has its motion greatly accelerated. From the time it arrives within $3\frac{1}{2}$ degrees of the solar equator, until it has passed it $3\frac{1}{2}$ degrees, it moves with such rapidity, that it passes 7 degrees in 18 days ; whereas at 20 degrees north latitude, it spends a whole month in going $3\frac{1}{2}$ degrees, and another month in returning ; so that it is as near the tropic for 67 days, as it was to the line for 18. This is a clear demonstration of the superior repulsive power of the sun's vertical rays ; which is the true cause of the earth's elliptical revolution ; for as soon as the earth has passed the line, it gradually falls nearer to the sun. To say, that the earth recedes to the greatest distance from the sun, when it is most powerfully attracted ; and approaches nearer to the sun, in consequence of being less attracted, is a perversion of both common sense and language.

BUT here it may be asked, if the action of the rays of the sun, and the re-action of the earth's atmospheric cone, are equal, what causes the earth to recede to the greatest distance, and form an elipsis, in approaching the equatorial diameter of the sun ? To
which

which I answer, that the powers of appulsion, are exactly proportioned to the density and elasticity of the medium through which the moving body passes, and that of its own atmosphere. Now, as the vertical rays of the sun are propelled in perpendicular lines, in greater quantity and with more velocity, they will heat and rarify the regions through which they pass, to a greater distance, than the rays sent off near the polar regions, will do; therefore, the earth will gradually move on, receding from the sun, until the medium against which its atmospheric tail or cone is to act, is of sufficient density and elasticity to enable it to antagonize the repulsive power of the sun's atmosphere. The equality of the powers of action and re-action, is the cause of the annual and diurnal revolutions of the earth; and, also, the cause why the tides on the opposite side of the earth, correspond so exactly with the tides on this side. The following experiment will show the law by which the planets perform their revolutions, to wit:—Take a glass tube eight inches diameter and 20 long, fix a cork in each end, into which, put two strong straight needles for an axis, place them before a good fire, made in a narrow fireplace, support the axis by two straight, smooth pieces of hard, close-grained wood, declining a little from the fire, the tube will ascend towards the fire; and when its progressive motion is stopped, which may be done by putting two pins before the axis, it still continues to revolve on its own axis. See Philosophical Transactions, No. 476.

THE earth's atmospherical cone is, undoubtedly, actuated by an electrical influence, like the tail of a comet, but not to so great a degree; as I am confident that the atmospheres of every planet and comet, are exactly accommodated to the quantity of matter contained in each of them, and the revolutions which they are respectively to perform. As the atmosphere is the vehicle, and the solid inert matter the burthen, to be removed; it is for these reasons that I assert, that it is by means of the repulsive influence of the sun's atmosphere acting outwards, and the appulsive influence of the earth's atmospherical cone acting in opposition to it, that the earth acquires both its annual and diurnal motions. And, as the causes, which at the first set the solar system in motion, and overcame their vis inertia, are still acting with unimpaired vigor, and so will continue until the sun, (which, under the great first cause, is the secondary cause of all the motion in our system) ceases to revolve on his axis. We have no need of supposing that the planets move in a perfect vacuum, or of fabricating any other whimsical reasons, to account for the long unimpaired projectile motions of the comets and planets, contrary to experience and all the known laws by which projectiles are governed.

WHEN we contemplate the laws of repulsion and appulsion, or action and re-action, we find every difficulty obviated respecting the bulk and distances of the planets, as it is only necessary that the atmosphere should be accommodated to the bulk, density, and consequent vis inertia of the planet it is to govern,

vern, and the density and elasticity of the medium through which they have to pass, in their annual revolutions. For instance, Jupiter and Saturn, which are stupendously large, and are placed at an immense distance from the sun, undoubtedly have atmospheres proportioned to their bulk, and that they are highly electrical, appears evident from their great splendor, which nearly equals that of the fixed stars. And were any planet to be forced from its orbit, by any preternatural cause, to a greater distance from the sun, its atmosphere, acting against a more dense medium, would bring it back to its former circuit; and if forced inwards, the repulsive power of the sun's rays would propel it to its former track. This happens to our globe twice every year, when passing the equatorial diameter of the sun, it is driven to a region where storms and tempests rage with violence, and are commonly denominated equinoctial storms. But when it approaches the tropics, it is brought nearer to the sun, by the action of its atmosphere on a more dense medium, which is the true cause of its elliptical revolution.

THERE is, certainly, a point at which the elastic spring, or expansive power of excited or heated air, is exactly counterpoised by the density or weight of cold air. If a blow-pipe be fixed into the neck of an ox's bladder, and held down by the bottom, to prevent it from rising to the surface of the water, it may be inflated with air, to its full extent, although it be surrounded by a fluid that is 800 times more dense. The same experiment would succeed in quick-silver.

THAT

THAT the expansive and repulsive power of the air is very great, is demonstrated by its compressing the surface of water so as to force it to rise 33 feet in the exhausted tube of a common pump : it also proves that there can be no such vacuum, as some philosophers suppose the earth and other planets to revolve in ; for, if there was any space that was not filled with active repulsive matter, the solid globes would immediately rush into it, and fill it up. Thus we see, the doctrine of planetary projection must fall to the ground, as every projectile must do, that moves through a resisting medium ; unless there is some active power, constantly exerting its influence, to keep it in motion, and enable it to overcome the resistance.

I PRESUME a slight consideration of the subject will be sufficient to evince the propriety of drawing the equator, tropics, and ecliptic over the sun's disk, whose station is permanently fixed, by which means astronomers may calculate from a fixed point, in preference to drawing them over the earth. In the latter case, our language, if not our ideas, are at continual variance with facts : thus, we are used to say in June, when our days are longest, that the sun, in his annual progress, has arrived at the tropic of cancer. When, agreeable to real fact, our earth, in its annual revolution, has arrived at the tropic of capricorn, which constitutes our summer, by bringing our northern hemisphere more under the influence of the direct rays of the sun ; while those who inhabit the same parallel of latitude, south of the solar equator, are carried as many degrees to the southward

southward of that line, as we were north of it in December, which constitutes their winter; so that those who live at the terrestrial equator are brought every year $23\frac{1}{2}$ degrees north of the solar equator, and carried $23\frac{1}{2}$ degrees to the southward of that line, which is 2820 miles; and are nearest to the sun in June and December, and removed to the greatest distance from it in March and September, when passing the points where the ecliptic intersects the solar equator, which points constitute the greatest length of the elliptical orbit, in which the earth revolves round the sun. At both of these periods, to wit, in March and September, the earth is equi-distant from the sun; and not as some astronomers have conceived. See Encyclopedia, Fol. 790. No. 136.

“ The earth’s orbit being elliptical, and the sun
 “ constantly keeping in its lower focus, which is
 “ 1,617,941 miles from the middle point of the
 “ longer axis; the earth comes twice so much, or
 “ 3,235,882 miles nearer the sun at one time of the
 “ year than at another; for the sun appearing un-
 “ der a larger angle in our winter than in summer,
 “ proves that the earth is nearest the sun in winter.”

THAT the earth is nearer to the sun in December than in March or September, I have elsewhere endeavored to demonstrate. But that the sun is not in the centre of the elliptical orbit, I cannot believe; because it is apparent, that the same impulsive powers which actuate the earth in its progress in the line of the ecliptic, from the tropic of Capricorn to the tropic of Cancer, must also actuate and impel it in the like manner, from the time it leaves the tropic of cancer

cancer until it arrives again at the tropic of capricorn. And, in consequence, if equal causes are allowed to produce equal effects, when the earth is passing the two points where the ecliptic intersects the solar equator, the distance of the earth from the sun must be exactly the same in both cases, and, consequently, the sun in the centre of the elliptical orbit. The most probable conjecture which I can form, from which such an opinion could originate, is, that our northern astronomers observed that we approached nearer to, and receded from, the sun once every year, without ever considering that the same phenomena must occur to the people of the southern hemisphere, who inhabit the same parallel of latitude, once every year also, although at an opposite season; they, therefore, concluded that the earth came dipping down from on high, and passed round the sun like a comet, and rose up again into the higher regions of space.

ALTHOUGH Fig. IX. is not drawn with any degree of accuracy, with respect to distances or the magnitudes of the bodies represented, being only intended to shew the changes that take place in our globe, in consequence of the different relative situations in which it is placed, in the course of its annual revolution, with respect to the sun and the moon; yet, I presume, an inspection of the plate will sufficiently show, that the sun must appear under the same angle to the people of the southern hemisphere, who inhabit the same degree of latitude, south of the solar equator, on the 21st day of June, that it does to us on the 21st day of December; and that they are as
near

near the sun in their winter, and exactly as far from it in their summer, as we are; and, consequently, the sun placed in the centre of the elliptical orbit.

It also shows, that the tides in the Atlantic Ocean, increase in depth, as they recede from the equator, and are scarcely perceptible under it, even when the sun and moon are vertical, which demonstrates that the tides are caused by the repulsive influence of the sun and moon, and not by attraction; which would reverse these circumstances, if the Newtonian hypothesis were well founded; to wit:—That attraction increased with the squares of the distance, and diminished in the same ratio, as the body was removed to a greater distance.

ON the 21st day of June, the earth arrives at the tropic of capricorn, $23\frac{1}{2}$ degrees south of the solar equator: being then removed so far to the southward, brings us more under the influence of the direct rays of the sun, which constitutes our summer, and the winter of the southern hemisphere, and are then distant from the sun 93,555,059 miles.—On the 23d day of September it enters Aries, and is then directly over the centre of the sun, and distant 95,173,000 miles, that is, 1,617,941 miles farther from the sun, than it was on the 21st of June.

ON the 21st day of December, the earth enters the tropic of cancer, and is then $23\frac{1}{2}$ degrees north of the solar equator, and is 93,555,059 miles from the sun, which constitutes our winter, and the summer of the southern hemisphere: and, although the
earth

earth is 1,617,941 miles nearer to the sun, than it was on the 23d day of September, yet we experience a greater degree of cold, because we are removed nearer to the north pole of the sun, where his rays are more feeble, and less numerous, than the direct rays from his equatorial regions. From this cause, the most intense degree of cold always prevails opposite to the poles of the sun.

ON the 21st day of March, we arrive at Libra, or the middle point exactly under the centre of the sun, where the ecliptic intersects the solar equator, and are now removed 95,173,000 miles from the sun; exactly as far distant as we were on the 23d of September. At both these periods, the days and nights are equal in length, because the solar and terrestrial equators are coincident.

IF the British astronomers would take the exact latitude of their settlement at Botany Bay, and take the angle at which the sun appears on the 21st day of June, and do the same on the 21st day of December in the same degree of north latitude, I am positive the angles would correspond, provided the observations are made on the water, and thereby convince them that the sun is placed in the centre of the elliptical orbit.

I ALSO wish that our navigators, when coasting along the American shore from Georgia to Salem, would observe in what direction the flood tides set; if the current of the tide which causes high water in our bays, harbors, and rivers, sets from north to south,

south, it will be an evidence that it is brought from the polar regions, by the attractive influence of the sun and moon towards the equator.

BUT if, on the contrary, it should be found, that the current of the water along the coast in calm weather, which causes high water in our bays, harbors and rivers, is from the southward to the northward, it will be a plain demonstration, that the water is forced from the equator, by the repulsive influence of the sun and moon, and not by attraction, as has been generally supposed.

It may possibly be objected that the flood tides in those rivers which run from the southward to the northward flow to the southward: and flow to the northward in those rivers only which run to the southward. But this circumstance only shows the tendency of water to find its level; for when it is accumulated in bays and harbors, raising it higher than the beds of the rivers, it will naturally flow in all directions; until the repulsive powers which caused the accumulation, have passed and ceased to act; when the water will return back towards the equator, until it is repelled again, being accumulated at the equator by the swift rotation of the earth on its axis, as already explained.

As the physical system of Sir Isaac Newton, appears to be almost universally established the orthodox creed of astronomers; I am afraid of being excommunicated as a presumptuous philosophical heretic. This consideration renders me solicitous to es-

tablish such parts of my system, as I conceive to be essential, by endeavoring to render my ideas as intelligible as possible. One of these is, that the sun receives the electric fluid, or igneous pabulum, in a state of condensation, at his poles, into a central cavity, where it is rarefied, agitated and heated, to the most intense degree, and emitted with amazing velocity, through curving pores, from his equatorial and tropical regions ; but in more feeble and scattered rays, from the regions near each pole.

I HAVE already endeavored to prove, that the whole solar system is replete with repulsive matter. I may be told that this is only conjecture : to which I answer ; that it is founded upon what we are taught by daily experience, and the converse hypothesis, contrary to the experience of every person, from the natural philosopher to the common sailor. Every person who understands the use of the air pump, knows how difficult it is to create a very small vacuum, and that none except the torricelian vacuum is perfectly so : he also knows that the air presses with a force equal to 15 pounds on every square inch, to fill it up : and a sailor, who has made but one voyage in a leaky ship, knows how difficult it is to create a vacuum in the hold of a vessel, surrounded and deeply immersed in water.—In this case, I judge by analogy from what I know ; but those who contend for such an extensive vacuum, as to afford a sufficient space for the earth and other planets to revolve in, reason against all experience, from what they do not know.

It

It is also known, that if a globe be swiftly whirled on an axis, and water poured on it, the water will collect and fly off at the equator of the globe, and not at or near the poles.—Those conversant in pyrotechny, are well acquainted with the power of fire to turn a globe, or fire-wheel, which is effected by the stream of fire acting against the elastic spring of the air, in the same manner that a sky-rocket is impelled to move in a contrary direction to that in which the fire issues: the electrical horse-race, is produced by the same means.

THESE instances are sufficient to prove, that fire is a powerful instrument in producing motion. And whoever has inhabited this city but one year, which is but 41 degrees from the equator, will need but few arguments to convince him, that it is warmer near the equator than the poles of the sun. And it is a well known fact, that when the air is greatly rarefied by heat, it will ascend; and the air that is colder and more dense, will flow into the space that had been occupied by that which had ascended.

IF, therefore, the repulsive fluid, in the regions north and south of the poles of the sun, be colder, and, consequently, more condensed than the fluid in his internal cavity, then it is demonstrably evident, that it will flow in at his poles, as fast as that which is heated and emitted in oceans of light is sent off from his circumference, to fill the regions of space, to actuate and govern the solid globes, and prevent the congelation of every thing which we call fluid, even the air itself.

THUS

THUS the sun, in some degree analogous to the heart of an animal, is constantly receiving the principle of life, in a crude state, rendering it fit to communicate light, heat, motion and fluidity; and circulating it through space to the various members which compose the stupendous system.

IF any person who may read the foregoing pages with attention, and is yet an advocate for the doctrine of projection and attraction, let him only attend to, and carefully observe, the different directions of the tail of a comet, in the various stages of its revolution round the sun, from the time it becomes visible until it disappears, and I am confident that he will have the most convincing ocular demonstration, that the comet is actuated by the powers of repulsion and appulsion, and not by the powers of projection and attraction; as it is evident, that the atmosphere of the comet is violently repelled by the rays of the sun, from the time it becomes visible until it disappears.

WHILE a comet is approaching the sun, it might be alledged, with some color of reason, that the tail followed the comet, because it was lighter than the solid compact matter of which the nucleus was composed; and, therefore, could not move through space with as great velocity as the solid body, but, in consequence, remained in a long train behind, although the sun might be attracting both the comet and its atmosphere with great power all the while. But this specious hypothesis is contradicted and invalidated, by what takes place in its perihelion and its
ascension

ascension from the sun; for we find, when the comet reaches its perihelion, the tail is generally very much lengthened by the rarefaction from the heat, and by the increase of the sun's repulsion, or that of his atmosphere. It still continues projected exactly in the opposite direction from the sun; and, when the comet moves off again to the regions of space, the tail, instead of *following* it, as it did on its approach, is projected a vast way before it, and still keeps the body of the comet exactly opposed betwixt it and the sun; until, by degrees, as the distance increases, the length of the tail is diminished; the repulsion, probably, becoming weaker and weaker, from a diminished degree of excitement. It has likewise been observed, that the length of these tails are commonly in proportion to the proximity of the comet to the sun. That of 1680 threw out a train that would almost have reached from the sun to the earth. If this had been attracted by the sun, would it not have fallen upon his body, when the comet, at that time, was not one-fourth of his diameter distant from him? But, instead of this, it was darted away to the opposite side of the heavens, even with a greater velocity than that of the comet itself. Now, what can this be owing to, if not to a repulsive power in the sun or his atmosphere? and, indeed, it would at first appear but little less *absurd* to say, that the tail of the comet is all this time violently attracted by the sun, although it be driven away in an opposite direction from him, as to say the same of the comet itself. It is true, this repulsion seems to begin much sooner to affect the tail, than the body of the comet; which is supposed always to pass the sun before it begins to fly away from

from him. This is by no means the case with the tail, which is repelled to the opposite side of the comet, while it is several thousands of miles distant from the sun, and is always propelled before the comet in ascending from the sun.

IN contemplating these phenomena, I think it sufficiently evident, that the atmospheres of comets are extremely electrical, and that their atmospheric matter is excited and rendered active by the impulse of the rays of the sun; and that this effect increases in proportion to the diminution of the distance. When a comet is first discovered, a considerable portion of its atmosphere is rendered active, and propelled to the opposite side of the comet, which forms its tail, whose action against the surrounding atmosphere, like that of a sky-rocket, impels it towards the sun, with increasing velocity. (See Fig. II.) Because, as it approaches the sun, more and more of its atmospheric matter will be excited and rendered active, until a sufficient quantity is rendered so active, as to antagonize the atmosphere of the sun, and by *re-action*, prevent it from falling into his body. (See Fig. I.) And the tail veering round at the same time, prevents the nucleus from going off in the direction in which it descended, and turns it fairly round the sun, as a mariner turns his ship: and when it is in its perihelion, the tail is in a suitable direction to act in aid of the prodigious degree of motion it had acquired in its descent to the sun; which continues to repel it with such violence, that the tail is now projected some thousands of miles before the nucleus, and most probably goes on diminishing

minishing in length, and moving with less velocity, until it arrives within the sphere of influence of another sun, similar to ours, where it performs another perihelion, and then returns. (See Fig. X.)

I ALSO conceive it to be very probable, that the end for which comets are designed by the Deity, may be, to keep the electric fluid in the regions through which they pass, in a state of activity, and to bring a large supply into the regions in the vicinity of the sun ; as I believe that even the electric fluid itself, would at length become inactive, were it not to be excited frequently by some such means ; then, instead of heat, motion, fluidity and light, would succeed cold, solidity, rest and darkness.

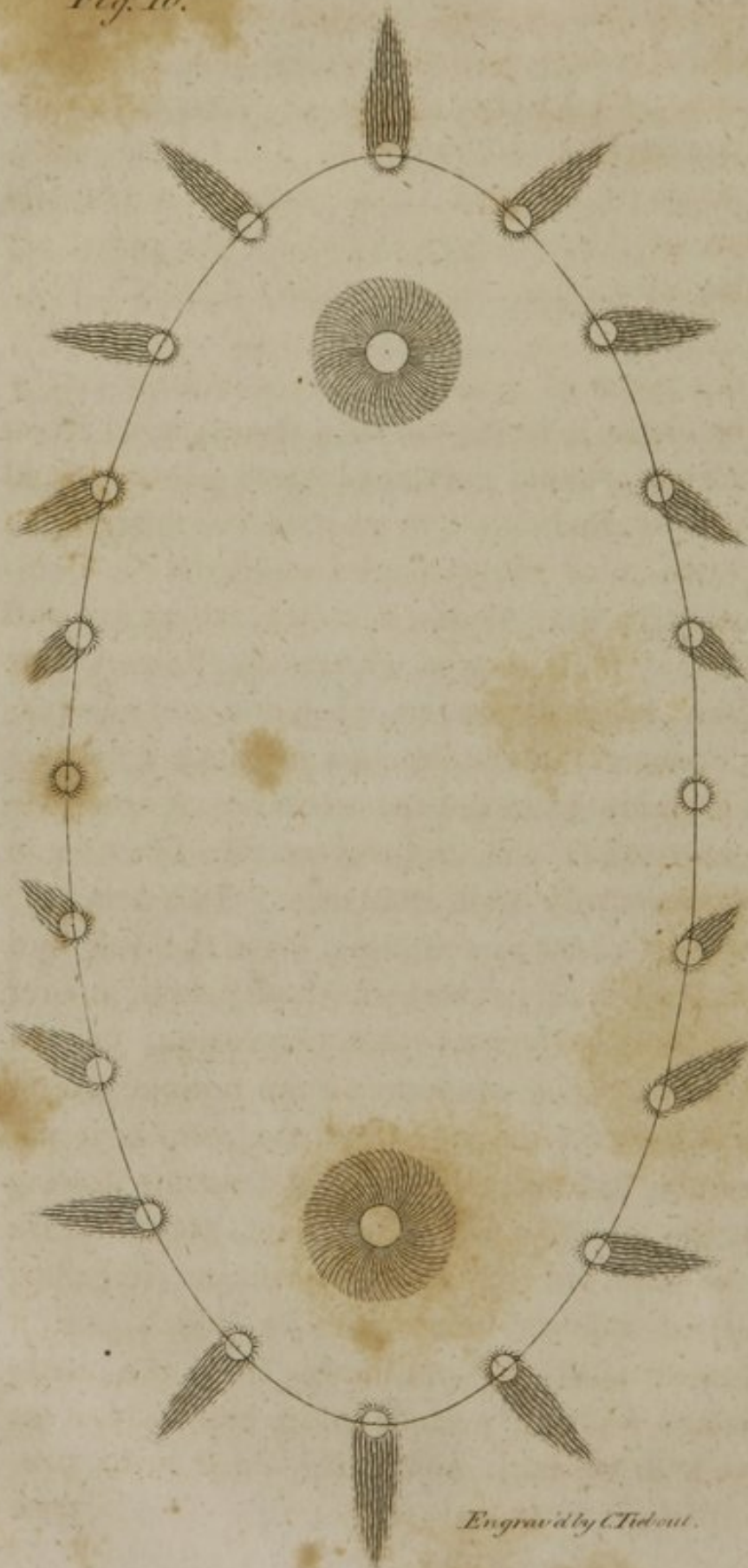
THE greater coincidence there is between the axis of a comet or planet and that of the sun, the nearer the path in which it revolves, will approach to a perfect circle.—If the earth, instead of passing along the ecliptic, were to revolve in the equator of the sun, it would remain at an equal distance from that luminary, during its annual revolution ; which would produce a perfect circle, as repulsion and appulsion would be uniformly equal, because the atmospheric cone of the earth, and the medium against which it acted, would acquire and retain an equal degree of activity.

It is amusing enough, to observe to what shifts the Newtonians are driven, in their endeavors to support their chimerical hypothesis of *projection* and *attraction*. By their reasoning, they endeavor to invalidate

validate the evidence of ocular demonstration : they see and acknowledge, that while a comet is approaching the sun, its tail is projected to an immense distance behind its body ; and, on the contrary, in its recession from the sun, the tail, instead of being *attracted* by the sun, and remaining behind the body of the comet, is propelled to an immense distance before it : (as in Fig. X.)

IN order to invalidate this demonstrative elucidation of the laws of *repulsion* and *appulsion*, which seems more than every other phenomena in nature, to be intended by the Deity, to give an ocular demonstration of the mode by which he actuates and governs such huge masses of solid matter, they tell us, “ that Sir Isaac Newton, that great
 “ philosopher, supposes the comets to have an at-
 “ mosphere peculiar to themselves, and consequently
 “ in their nearest approaches to the sun, both comet
 “ and atmosphere are immersed in the atmosphere
 “ of that luminary ; in this case the atmosphere of
 “ the comet being prodigiously heated on the side
 “ next the sun, and consequently the equilibrium
 “ in it broken, the denser part will continually pour
 “ in from the regions farthest from the sun, for the
 “ same reason the more rarified part which is before,
 “ will continually fly off opposite to the sun, being
 “ displaced by that which comes from behind ; for,
 “ though we must suppose the comet and its atmos-
 “ phere to be heated on all sides to an extreme de-
 “ gree, yet still that part which is farthest from the
 “ sun will be less hot, and consequently more dense,
 “ than what is nearest to his body. The conse-
 quence

Fig. 10.



Engraved by C. Tiebout.

“ quence of this is, that there must be a constant
“ stream of dense atmosphere descending towards
“ the sun, and another stream of rarefied vapours
“ and atmosphere ascending, on the contrary side,
“ just as in a common fire, there is a constant
“ stream of dense air descending, which pushes up
“ another of rarefied air, flame and smoke.”

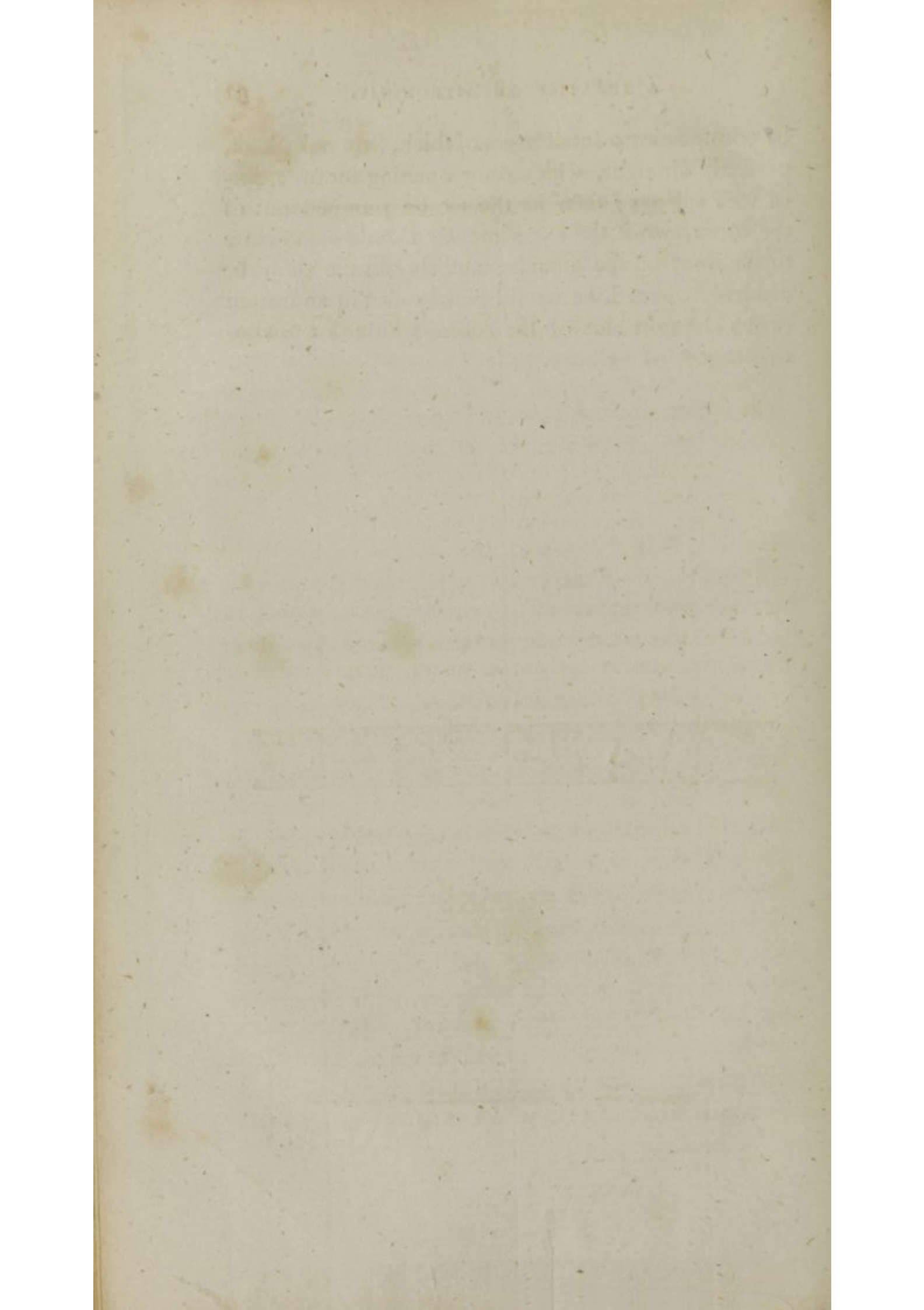
By this mode of reasoning they undertake to explain the cause, why the tail of a comet, in its recess from the sun, should overcome every obstacle, and fly off before the nucleus to an immense distance, in direct violation of the principles which the Newtonians themselves have assumed, to wit, attraction and gravitation. It is almost universally known, that light elastic matter in motion, when compressed equally, will progress in the direction in which it first acquired motion; but when the resistance or compression is unequal, it will progress in the direction in which it meets with least resistance. This being the case, when a comet is returning from the sun into the regions of space, where the atmospheric matter must, according to their own concession, be in a greater state of condensation on the remote side of the comet than on the side next the sun, is it not demonstrably evident, that the cold dense air flowing in from the remote side of the comet, would move on in the same direction towards the sun, impelling the rarefied vapour before it? In which case it would meet with less resistance from the medium through which it passed; more especially, if we conceive it to be most powerfully aided in its progress

gress by the Newtonian powers of projection, attraction and gravitation? Should any person affirm, that he had seen smoke progress with great velocity against a strong north wind, no one would believe him; but this is not more incredible, than to suppose a rarefied vapour, possessed of such invincible powers as to overcome such potent obstacles, and force its way through a cold dense medium, with a degree of velocity almost equal to light, projecting itself some thousands of miles before the body of the comet, flying at the rate of some millions of miles in an hour.

IF a carcuss were to be discharged from a mortar, blazing through the air as it flew, would it not be extremely absurd to expect, that the air rushing from before the carcuss in its flight, should impel the air behind it to advance before it in a stream of light, like the tail of a comet ascending from the sun? It may possibly be objected to the doctrine of the repulsive power of the sun's atmosphere, that its rays, concentrated in the focus of a burning-glass, will not move a wheel constructed of the lightest materials. But to obviate this objection, it is only necessary to observe, that the earth revolves exactly in that space where the powers of action and re-action are equally balanced. The person who would ground an objection on the result of this experiment, might, on as plausible evidence, deny that still air had any horizontal or lateral pressure, because he could feel no resistance in moving through it in any direction; although he might easily be convinced of his error,
by

by constructing a small room of thick, firm oak plank, perfectly air tight, with a door opening inwards, fixed with springs; then let the air be pumped out of the room, while the experimenter should stand close to the door on the outside; and should the door be suddenly opened, he would be impelled in an instant to the opposite side of the room, with a demonstrative degree of velocity.

END OF THE TREATISE ON ASTRONOMY.



A
PHYSIOLOGICAL TREATISE,

IN WHICH

THE FIRST STAGE OF ANIMATION IS CONSIDERED, AND
THE MEANS SHOWN BY WHICH CIRCULATION IS
PERFORMED IN THE FIRST RUDIMENTS OF THE
INCIPIENT ANIMAL, BEFORE THE VESSELS
ARE COMPLETELY ORGANIZED ;

&c. &c.

TOGETHER WITH

AN EXPLANATION OF THE GENERAL LAWS BY WHICH THE
ANIMAL ECONOMY IS GOVERNED ; AND PARTICULARLY
THE MODE WHEREBY THE OPERATIONS OF THE
VIS MEDICATRIX NATURÆ,
OR THE UNASSISTED POWERS OF NATURE,
ARE EXERTED TO OBVIATE AND CURE DISEASE.

ALSO,

SUCCESSFUL METHODS

OF

CURING

CANCEROUS ULCERS ; THE QUARTAN AGUE ; PUTRID
FEVERS ; STOPPING MORTIFICATIONS ; AND EX-
TRACTING FROST, SO AS TO LEAVE THE
FROZEN MEMBER PERFECTLY WELL.

PHYSIOLOGICAL THEORY

THEORY OF THE NERVOUS SYSTEM
AND THE SENSES
AND THE SENSES
AND THE SENSES

THEORY OF THE NERVOUS SYSTEM
AND THE SENSES
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THEORY OF THE NERVOUS SYSTEM
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AND THE SENSES

PREFACE

TO

THE PHYSIOLOGICAL TREATISE.

I HAVE purposely inserted the Treatise on Astronomy before the medical part, as I have taken some pains in that, to explain the general laws of nature ; and in the following pages, I have endeavored to explain those in particular, by which the animal economy is governed.

I PRETEND neither to infallibility, nor to the possession of superior talents ; but if I have been so fortunate, as to improve science, by having made any useful discovery, it must be attributed to the habit I have long been accustomed to, of analyzing every subject submitted to my consideration, at first, in the shortest and most simple method, to discover its nature and principles ; and if, upon the first view I had taken of the subject, I had formed an opinion, it was retained in my mind, to be re-examined at leisure : I seldom formed hasty conclusions, but kept the subject in view, that the slight opinion which I had formed, might either be confirmed or discarded, as future observations and experiments might confirm, or invalidate it ; and always endeavored to guard against the effects of prejudice and prepossession.

THE rudiments of education which are generally acquired in schools and colleges, and even in medical apprenticeships, is but the alphabet of science ; but it is of infinite importance to the student, to be taught, that in all investigations, he should endeavor to discover first principles, as it is impossible either to understand or teach any science,
without

without this knowledge ; and, as the science of physic in its various branches, is not only the most important, but the most intricate, that has ever engaged the faculties of the human mind, how anxiously should we endeavor, by all the powers of reason, to investigate the general laws of nature, and those, in particular, by which the animal economy is governed ? I know there are many, who inveigh against reasoning, and framing hypothesis, because numbers have reasoned erroneously, and propagated error. But if those who have reasoned from facts and analogy, in their investigations of the laws of nature, have erred, how much more must they be subject to err, who will not reason at all ? The physician, who will not endeavor to form a consistent theoretical system for himself, but is satisfied with borrowing scraps of the opinions of every different author he reads, can never form any solid, consistent opinion of his own. First principles, are founded on the established laws of nature, which never vary ; if we mistake them ten times, we should not be discouraged ; our misconception will not alter their nature, they are still in being to be re-examined. Where we cannot at present arrive at mathematical demonstration, it is not because the science has no fixed principles, but because we have not yet discovered them ; we should, therefore, persevere ; many things are well understood at this day, that were entirely unknown fifty years ago.

If my system is founded in truth, on the solid basis of the laws of nature, all I request, is, that every physician of genius, will improve the sketch I have given, and render it beneficial to mankind. But after the candid critical reader, has scanned it over with attention, until he is satisfied that he understands my meaning, and conceives I have been mistaken, he may improve his own knowledge, by correcting my errors. It will at least be attended with this advantage, it will bring him to the true touchstone of all science, the unerring laws of nature ; and no man of genius has ever had cause to repent his having spent some time, in traversing this ground, as a knowledge of the laws of nature is

as necessary to the philosopher and physician, as the compass and quadrant are to the mariner; and it is evidently as impossible, that a man should be a good physician, without a knowledge of these laws, as that a blind man should be a good portrait painter. The real cause, why the inhabitants of the earth in general, have remained so long in ignorance, and consequently in a state of slavery, is, because they will not reason for themselves, but trust to others to reason for them, whose researches seldom extend farther than to enquire what were the opinions of their great grandfathers. But if motives were wanting, to excite us to exert and improve the faculties of our own minds, we might derive encouragement from the example of the immortal Franklin, who, without the advantages generally supposed to be derived from an academical education, gained more knowledge from observation, and the exercise of his own faculties, than he acquired from every other source

THOSE physicians who continue blindly to discard the humoral pathology, and look for the first spring of motion, life and sensation, in the solids, will ever remain ignorant of the laws of organic life: for solid matter, without the agency or energy of *fluids*, never did, and never will commence, or continue, any permanent motion or action whatever, being by the condition and circumstances of its own nature, inert. Solid matter cannot move itself, and therefore cannot exert any impulsive power, to communicate motion to any other body, although in contact with the body to be moved. There is no kind of matter that can act where it is not; even fire, which appears to be the most active, can neither heat nor burn the most combustible matter, until it comes into actual contact with the substance to be acted upon. This being the case, I think there cannot be a more self-evident truth in nature, than that it should be the first business of the medical student, to enquire into, and become acquainted with the first material cause or spring of *motion* in the human system; and yet nothing has been more neglected: and when it has been attempted, it has been

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done

done in a way, calculated to perplex and embarrass, rather than to inform the understanding, or direct the judgment of the pupil.—The human body is composed of both *solids* and *fluids*, which are reciprocally affected by the morbid changes that take place in either.

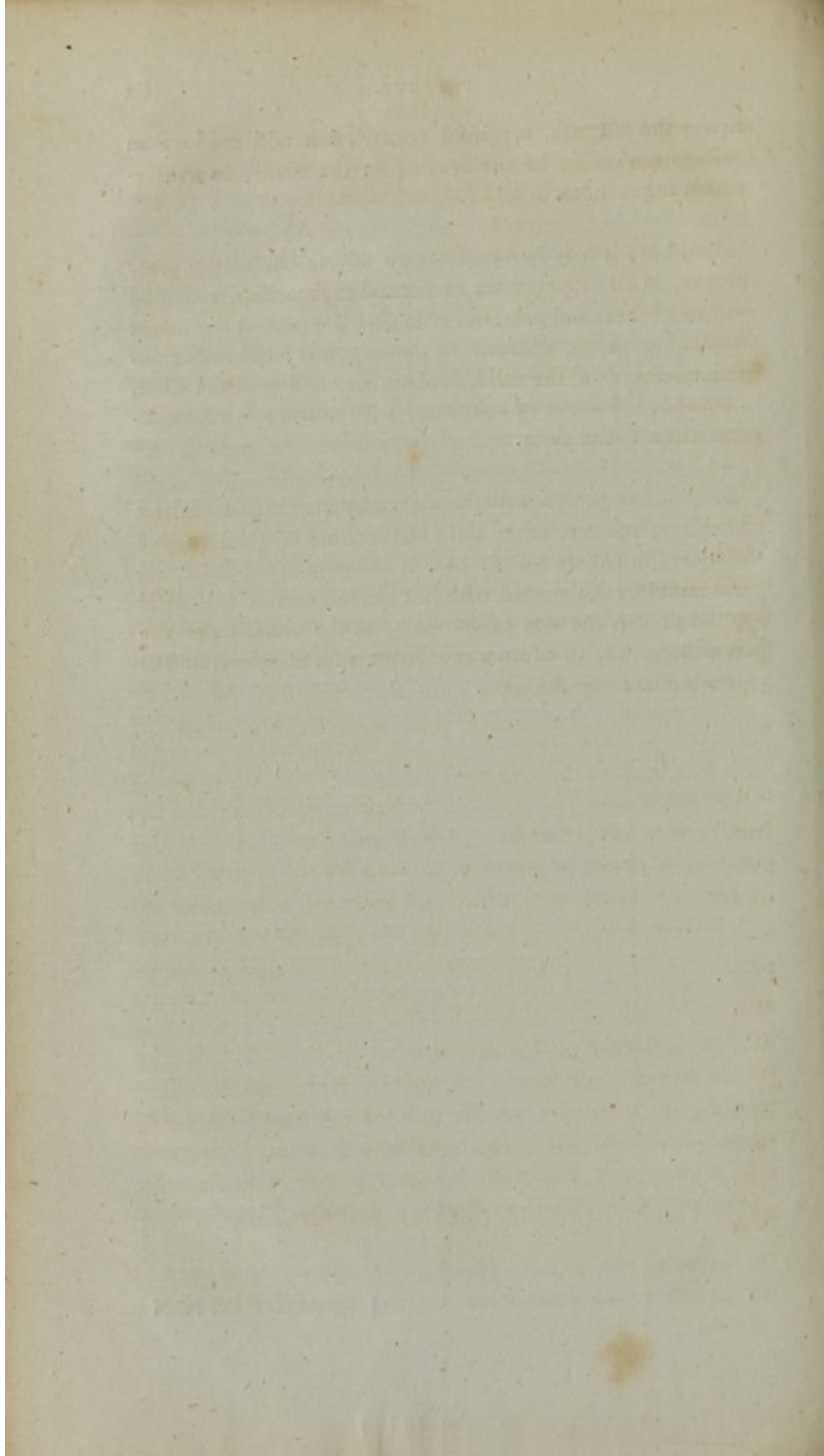
THE *fluids* communicate heat, motion, life, sensation and energy, to the *solids*; and the nerves and vessels convey the fluids to every part of the system, as conductors and canals.—The solids may be injured in a variety of different ways. The flux of spirits into particular muscles, may be impeded, by a compression of the nerves; and although every part of the limb be perfectly sound and entire, it will become paralytic, and remain without sensation, or the power of motion, until the compression is removed.—The vessels and glands may be inflamed, obstructed, tumified, or eroded, by acrid corrosive humors, &c. &c. Our fluids may be too thick and viscid, too thin and acrid, too insipid or saline, too acid or alcalescent, too vapid or rendered too active or stimulant, by the addition of some contagious matter, or by the too sudden excitation of a quantity of the spirit received from the air in respiration, which had been retained, without being excited and extricated at the time of its reception.—We are daily taking aliments to nourish the body, and replace the matter that is continually abraded from the solids, and carried off; a very small portion of which, is converted into the substance of the body, and retained; the residue, by stimulating their appropriate emunctories, either by their bulk or acrimony, excites a temporary flow of spirits to the parts, increasing both their irritability and muscular strength to expel their contents:—When the intestines are sluggish and torpid, a stimulating purge will answer this purpose; or if the bladder is inert, a few drops of the tincture of cantharides, will excite a sufficient flow of spirits, to enable it to discharge its contents.

BUT here caution is necessary; for, if the quantity of spirits derived to the part, is much more than sufficient to
answer

answer the purpose, a painful constriction will produce an entire suppression of the evacuation the medicine was intended to promote.

AND here it may be necessary to advise the young practitioner, in all suppressions of natural evacuations, attended with much heat and pain, never to give the patient any smart stimulating purge, diuretic or emenagogue ; but rather administer those of the mild, lenient, or cooling saline kind, in aquaous infusions or solutions, with warm spirituous fomentations to the parts.

SPASMODIC pains are distinguished by the absence of heat and thirst ; opiates, ether and volatiles, are adapted to give the most immediate relief : but, if the pain is obstinate, the part should be embocated with hot spirits, and an epispastic applied as near the seat of the pain, as the situation of the part will permit, to cause a revolution of the spirits to the part stimulated by the flies.



INTRODUCTION

TO

THE PHYSIOLOGICAL TREATISE.

THE study of physic, in its various branches, is the most intricate, as well as the most important that ever has engaged the faculties of the human mind. Many grand discoveries have been made, by our predecessors, but much remains yet to be done. But when we contemplate the rapid progress made by modern chymists and philosophers, in developing many of the latent secrets of nature; may we not reasonably hope that we may soon have a rational system of physiology, and pathology, founded on self-evident principles?—But as no human production was ever brought to perfection, by any one person, it must be a work of time, and require the united labors of a number of the most able physicians, who are possessed of a sufficient degree of patience, sagacity and perseverance, to arrange and apply the discoveries of the modern chymists, to the improvement of the healing art. If the science of physic is ever brought to any tolerable degree of perfection, it must be effected by endeavoring to investigate first principles, that are founded on a knowledge of the permanent, invariable laws of nature, applied with judgment to the animal economy.

I WILL

I WILL not presume to say, that the principles which I now advance, are as perfect as they might be ; or that they are arranged, or treated in the best manner, to render the ideas of the author intelligible ; but this I aver, that the mode of endeavoring to investigate the general laws of nature, and the particular laws by which the animal economy is governed, is the most certain method of improving the science, and ought to be the study, as it is the duty, of every physician. And the doctrines which they teach, should be delivered in clear and explicit terms, divested of all ambiguity. When a teacher explains his first principles fairly, if they are well founded, they will be easily understood by others ; but if they are erroneous, they lay fairly open, and are liable to be corrected, both by his own observations, and those of others : but if he never endeavors to investigate any of the laws of nature, or assume any first principles, he must ever remain ignorant of the animal economy, and of the cause, and rational method of curing disease—as every disorder to which human beings are incident, must consist in an alteration from a state of health, either in the solids or fluids, or both. It is, therefore, the business of the physician, to discover what this alteration is ; by what means it is produced ; whether by affections or passions, to which the mind is subject ; to something bred in the system, and retained, which ought to have been expelled ; or, to external agents, to whose operations the body is continually exposed—as a knowledge of the cause producing a disease, often points out the rational method of cure. But barely knowing the name of a disease, or being able
to

to class it by its symptoms, can give no rational indication of what ought to be done to remove the unknown cause of the complaint. Every student in physic should adopt those principles, and that system, which appears to him the most rational, which he should endeavor to correct, and improve, by experience and observation ; but, if he finds it to be essentially wrong, he should discard it, and endeavor to establish a better : without pursuing this method, he will never be capable of making any improvement ; he will never have any solid opinion of his own ; and be forever subject to change, and adopt every new feasible hypothesis in the extreme ; and if he has acquired any consistent ideas, by perusing the works of any former writer, who has afterwards been convicted of one error, by a more modern author, the whole of the former system is discarded in bulk, and the latter as fully adopted, with all its imperfections.

THUS systems of physic have changed, almost as often as the ladies change the fashion of their bonnets : and this has happened, because those who framed the various hypothesis, and those who first embraced them, and afterwards discarded them, had not taken sufficient pains to investigate the general laws of nature, and those of the animal economy, to enable them to establish a set of incontrovertible first principles.

WHEN a schoolmaster undertakes to teach his young pupil to read, he begins with the simple characters of the alphabet ; when he would teach him arithmetic,

arithmetic, he instructs him to name the figures ; and then proceed to the numeration table, &c. If his pupil is to be a mathematician, he is at first taught the most simple self-evident principles imaginable, and so led on step by step, and consequently every additional degree of knowledge which he gains, is established on the immutable basis of truth.

BUT when the medical pupil is to be instructed in that important branch of pathology, which treats of the nature and cause of fever, he is puzzled, and confounded with an hypothesis, that Apollo himself could not comprehend. He is told that the proximate cause of fever has hitherto eluded the researches of physicians ; but as the hot stage is so continually preceded by a cold one, it is presumed that the *cold stage* is the cause of the *hot one*, and, consequently, that the cause of the cold stage is the cause of all that follows, in the course of the paroxism ; that in fever, there are three states, viz. a state of debility, a state of cold, and a state of heat ; and these states regularly succeed each other in the order abovementioned. It is presumed that they are in a series of cause and effect with regard to one another ; consequently, debility produces a sensation of cold, in which stage the extreme vessels are affected with *atony* and *spasm* at the same time ; and this cold, atony and spasm, produce heat.

THE author of this hypothesis is so candid, as to acknowledge the difficulty of explaining how *atony* and *spasm* can possibly subsist at the same time, in the same vessels ; but considers it as a matter of fact, which

which cannot be denied ; although it is clearly as impossible, as for a blacksmith to weld together two red hot pieces of ice ! Atony and spasm may succeed each other alternately, but cannot subsist together. This is the case in every conclusive disease, in which the muscles are alternately contracted and relaxed, frequently in very quick succession ; but as the conclusive contraction of a muscle, is caused by a preternatural influx of spirits, and the atonic relaxation of it, by a preternatural deficiency ; it is as evident, that atony and spasm cannot subsist in the same muscle, at the same time, as that there can be too great, and too small a quantity of *spirits*, present in a particular part, in the same instant of time. When this author comes to sum up his doctrine of fever, he says, “ Our doctrine of fever is “ explicitly this ;—The remote causes of fever are “ certain sedative powers applied to the nervous system, which diminishing the energy of the brain, “ thereby produce a debility in the whole of the “ functions, and particularly in the actions of the “ extreme vessels. Such, however, is, at the same “ time, the nature of the animal economy, that this “ debility proves an indirect stimulus to the sanguiferous system, whence, by the intervention of the “ cold stage, and spasm connected with it, the action of the heart and larger arteries is increased ; “ and continues so, till it has had the effect of restoring the energy of the brain, or extending this “ energy to the extreme vessels, of restoring, therefore, their action, and thereby especially overcoming the spasm affecting them, upon the removing of which, the excretion of sweat and other “ marks

“ marks of relaxation of the excretories take place.” In all this detail, we are amused with a relation of the changes which take place in the paroxysm of a fever; without an attempt being made to explain the *modus operandi* of either the remote, or proximate cause, of any one symptom. We are told of the energy of the brain, without being informed what constitutes this energy, or by what means it is transmitted from the brain to the remote parts of the system; of spasm, produced on the surface of the body, and in the extreme vessels, without an attempt being made to explain the cause of *spasm*! Of certain sedative powers being applied to the nervous system, which diminish the energy of the brain, thereby producing a debility of the whole of the functions, and particularly the actions of the extreme vessels, where atony and spasm are supposed to subsist together. If this is not reviving the old convenient doctrine of *occult qualities*, to account for, and explain the occult operation of nature, and the animal economy; I know not what may be denominated occult, if the above doctrine be conspicuous.—It is with reluctance that I have said so much to expose this theory; and no other consideration could have induced me to have said so much on the subject, but a clear conviction that this vague sceptical theory has, in some instances, had a tendency to cause students to neglect the perusal of the works of Haller, Whytt, Gregory, and many other valuable writers, who have endeavored to investigate the powers and operations of the animal economy, and the causes of disease. And I am persuaded that there may be more real medical knowledge acquired by a
perusal

perusal of the works of Doctor Whytt alone, than in spending the longest life-time in perusing the works of those, who doubt every thing, and establish nothing; who create a thousand difficulties, and never remove one. By what I have said of the above theory, I have not the most distant intention to dissuade medical students from reading the works of the author alluded to, as they contain much useful knowledge: I only wish to guard them against espousing his theoretical errors, amongst which, his discarding the idea of *lentor*, or viscosity, prevailing in the mass of blood, and stagnating in the extreme vessels, being the cause of the cold stage of fevers, and its consequences, is not the least.—He also combats the opinion as erroneous, that noxious matter introduced into, or generated in the body, is the proximate cause of fever; and that the increased action of the heart and arteries, which he alledges makes a great part of the disease, is an effect of the *vis medicatrix naturæ*, to expel this morbid matter. He observes, that this doctrine, though of as great antiquity as any in the records of physic, and received into every school of medicine, is nevertheless exceedingly erroneous. I presume there are but few physicians who are so ignorant, or perverse, as to deny, that the heart and arteries may be stimulated to such a degree, by noxious matters introduced into, or generated in the body, as to produce such a rapid circulation, and consequent increase of heat, as to constitute a very important part of the disease, and require the aid of the judicious physician to moderate the too intense action of the arterial system, and reduce the circulation and heat of the body,

so as not greatly to exceed that of a person in health. But would it not be extremely absurd to conclude, that because the excessive violent operations of nature, or the *vis medicatrix*, are productive of mischief, that it is never necessary that they should act with such an increased degree of energy as to produce some degree of fever, or that some degree of febrile commotion might not be necessary to attenuate, separate and expel noxious matters out of the system? I am as far from believing the *vis medicatrix* to be an intelligent principle, or that its operations are conducted with a conscious design to separate and expel noxious matters out of the system, as I am from believing that the powers which govern the constitution of our atmosphere, are under the government or direction of such conscious intelligence; and yet we perceive that the Deity has established general laws by which the temperature of the atmosphere is regulated and governed. When an undue degree of heat and consequent rarefaction prevails in any place, which renders the air much lighter than what is consistent with the economy of nature, the cold dense air which is much heavier, flows in from adjacent regions, frequently with such violence as to dismast ships, level whole forests, and overturn houses: but all this devastation affords no proof that a gentle, and frequently a violent current of air or wind is not often necessary, to purge and purify the air of large cities, from a vast accumulation of noxious putrid exhalations, and infectious miasmata. I conceive there has been but few practising physicians since the days of Hippocrates, who have not had the
most

most convincing evidence, that noxious matter, whether introduced into, or generated in the body, has been the proximate cause of fever; more especially those who have been much conversant in inoculation for the small-pox. In this operation, a small particle of variolous matter is introduced on the point of a lancet, under the cuticle of a person enjoying the most perfect health, which appears to be multiplied to an astonishing degree (in some instances) by a fermentatory process, and dispersed to every part of the body; where, by its stimulant operation on the nervous system, a variety of distressing sensations are created, which rouse the powers of nature, or *vis medicatrix*, into action, causing more frequent contractions of the heart and arteries, as well as more frequent and fuller inspirations, producing an increased degree of heat and febrile commotion, by which means the variolous matter, which had been generated in the mass of fluids, is separated, and expelled to the surface; and in every case where this operation is completely performed, the eruptive fever ceases: which agrees perfectly with the definition of the proximate cause of fever, given by the celebrated Doctor Gregory, to wit: “The
“most full and perfect proximate cause, is that
“which, when present, produces a disease; and when
“taken away, removes it; and when changed, also
“changes it.” And I think it full as evident, that the small particle of variolous matter, introduced into the body, is the proximate cause of the eruptive fever, as that a sword thrust through the body of a man, is the proximate cause of the wound.

BUT

BUT if neither the noxious matters introduced into, or generated in the body, is the proximate cause of fever, I think we stand a very fair chance to escape fevers of every kind, except such as can exist without any proximate cause; which will certainly reduce the catalogue considerably.

PHYSIOLOGICAL TREATISE.

As the first regular step to be taken in the investigation of every important subject, is to endeavor to establish a set of first principles, such as result from actual experiment, where that can be done, and an attentive observation of the laws of nature, which are uniform, and never vary in complaisance to the mutable opinions of philosophers and physicians—I shall endeavor to proceed agreeably to this rule, in the following dissertation.

Some Principles in Natural Philosophy, upon which the following Doctrines are founded.

THE sun is the reservoir of pure elementary fire, from whence it is diffused throughout our system. And fire in action, gives being to heat, fluidity, motion, light and life of all kinds, both animal and vegetable: for without heat, nothing would remain fluid in nature; and without fluidity, there could be no motion or circulation, and, in consequence, there could be neither *light* nor *life*. Although fire is the
only

only substance by which heat can be produced, being the only active matter with which we are acquainted, yet it often lies dormant, without perceptible motion, or sensible heat, but is still easily excitable. It is an indestructible element, and is not generated by friction or collision, more than water is generated by pumping. All other matter except fire, in its different modifications, is entirely passive, being only possessed of a power to impede or resist motion, termed *vis inertia*.——Having stated these few first principles, I shall proceed to explain some essential doctrines in Physiology, respecting the animal economy, agreeably to them, especially those by which heat, motion, life and sensation are produced at first, and continued afterwards in respiring animals.

1. THE animal spirits duly prepared, and injected with the male semen, set in motion by heat, and governed by laws constituted by the Deity, is the plastic means, by which the incipient embryo is produced out of an unorganized mass of animal gluten.

2. THE human body thus formed, is animated and governed by a soul, or sentient principle, in all its voluntary motions and actions.

3. THE animal spirits is the link by which spirit and matter are connected, and by whose agency alone the soul actuates the body, by the mechanism of the nerves and living solids; and is reciprocally acted upon, by things which affect the body, through the medium of the external senses.

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THIS fluid, is presumed to consist of the most highly attenuated parts of the lymph, the spirits collected in the stomach, in alimentary fermentation, and the electric part of the air, received by the lungs in respiration, so united and subtilized in the glandular fabric of the brain, that the lymph may prevent the escape of the more subtile active elements, out of the system, and in some degree, to restrain or impede its inconceivable activity; however, in certain cases, they act with a rapidity almost equal to lightning, by which means, a great part of the quantity in the system, is instantly decomposed and dissipated. When they are prepared in a sufficient quantity, of a good quality, and regularly distributed, they are the spring of animal heat, life, sensation and muscular motion: for *solids*, independent of the action or energy of *fluids*, never did, nor ever will originate any motion of any kind or degree; it being entirely passive and inactive. Many are of opinion, that muscular motion can be produced in a remote part of the body, by what they call the energy of the brain, without the transmission of any subtile active fluid from the brain, to the part to be actuated, and that a painful sensation can be instantaneously communicated from the foot to the brain, without the motion of any fluid. This I conceive to be impossible in our present mode of existence. For, if it should be alledged, that the soul resides equally in all parts of the body, and should therefore be conscious alike, of what happened to any part thereof; this is contradicted by daily experience. If the nerves are all divided, or completely compressed, no sensation can be transmitted to the sensorium,

rium, from the parts beyond the injured nerve, because the channels of communication are interrupted. It has also been said, that as the nerves reach from the brain to the remotest parts of the body, that sensation and the powers of motion, may be communicated to the distant parts by the nerves, at the command of the will, without the intervention of any subtile elastic fluid.

BUT is it not more reasonable to conclude, that the *spirits*, by whose plastic energy the solid parts of the body were formed, should continue to be the active spring of life, sensation and muscular motion, after the animated automaton is complete in all its parts? Daily experience informs us, that fluids communicate motion, when they come in contact with the body to be moved; but I can form no conception how solid matter can act or communicate motion where it is not, or in other words, how the brain, that is confined within the skull, should cause the erection of the penis, without determining a considerable quantity of active spiritous fluids to the parts: this is often done in sleep, without any external impulse whatever, and therefore cannot be the effect of vibration, which some contend for. When two masses of solid matter are in contact, and both at rest, it is impossible that one should communicate motion to the other, without the intervention of an active fluid. On the other hand, it is evident, that it is by the operation of fluids, that all our senses are acted upon. Sounds cannot be communicated to the ear, but by the intervention of some subtile elastic medium; neither can the images of external objects

jects be painted upon the retina, in any other way, than by the action of the rays of light, in very rapid motion ; for if the motion of the rays are very languid, darkness will prevail, and nothing can be perceived by the eye.

THE irritability and muscular force of the heart and vessels, depend entirely upon the nervous fluid. But it has been too generally supposed that the circulation of the blood and other fluids, were carried on by the force with which the heart and arteries were supposed to propel them ; and calculations have been made, to estimate the force or power, necessary to perform this office. I readily grant, that these powers are very considerable, but cannot be extended to the lacteals, lymphatics, cellular system, nor to the vessels of the foetus in utero : the subtile and powerful agent which performs this office with admirable facility, is the electric part of the air, which is received by the lungs in respiration, and diffused throughout the whole system, and circulates even through the smallest hair.

By its immediate energy, the heart is invigorated, and enabled without sensible fatigue, to continue its incessant action from infancy to old age ; being incorporated with the blood in the lungs, it circulates with it, rendering it more fluid, preventing cohesions, animating each globule, and impelling them with celerity through the most minute ramifications of the smallest vessels, that are at the greatest distance from the heart, and also extends its action to those which have not an immediate connexion with
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the heart, which office its muscular power could never perform, if unassisted by this powerful agent. When God created man, he breathed into his nostrils the *spirit of life*, and he became a living soul; and when we cease to inhale this spirit of life, we must soon cease to live, because circulation, and every other vital function, must also cease. Fire, in its various combinations and modifications, is the only active matter with which we are acquainted; and electricity and the animal spirits, are the modifications with which it behoves the physician to be particularly acquainted; although the other combinations are necessary to be known, as they are the agents, in all the combinations, and decompositions that are effected in matter.—I presume there is no philosopher who will deny, that it is fire which communicates warmth, motion, and subsequent animation, to the first rudiments of a chicken in an egg, that is hatched in an oven in the Egyptian mode. When an egg is placed and continued in the degree of heat, indicated by the 96th degree of Fahrenheit's thermometer, the spirits contained in the male semen, are excited and set in motion, by the heat, agreeably to certain laws constituted by the Deity, by which means the organization of the brain and nerves is first began, and in succession the heart, blood-vessels, members, &c. are completed, so that in twenty-one days, a perfect chicken is produced, out of an unorganized mass of slime or animal gluten. In this process, it is certain that the pelucid or spiritous fluids, are in circulation some time before there is any appearance of red blood, so that we must acknowledge, that it is by the motion and plastic energy of the spirits,
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that the brain itself is formed ; which afterwards becomes the sensorium, or seat of perception, the more immediate residence of the soul, and the gland by which the spirits are afterwards secreted and collected, for the important purposes of the animal economy.—In the case of viviparous animals, it might be alledged, that during the time of gestation, circulation was carried on in the vessels of the fœtus, by the force of the mother's heart ; but in the present case, the *heart* of the *hen*, can have no agency in the business ; therefore, circulation is commenced and continued by the agency of the spirits, q. e. d. If it should be alledged, that the rudiments of the future animal existed in an organized state in the male semen, and required only to be evolved, this will not alter the case, since there must have been a time when the future animal was an unorganized mass of matter. In a natural and healthy state, the spirits are secreted, collected and distributed, in a greater or lesser quantity, proportioned to the requirements of the animal economy ; but, in a diseased state, they may be either redundant, deficient or contaminated : in inflammatory diseases, they are generally superabundant, and too active, raising the circulation and heat to an extreme degree, and therefore venesection answers two good purposes, to wit ; by abating the tension and elasticity of the vessels, caused by plethora, and by diminishing the fountain from which the spirits are secreted, in proportion to the rapidity of circulation.

WHEN the spirits are secreted in the brain, they are distributed to every part of the system by the
nerves

nerves as conductors, of which the celebrated Dr. M'Bride imagined "there were two distinct sets: "one by which the spirits are transmitted from the "brain to the different parts of the system; and the "other to return them to the brain. It is also supposed, that the first mentioned set are adapted "principally for muscular motion; and the other "for perception and sensation; since it is observable "in some diseases, that the muscular strength shall "be totally exhausted, and yet the powers of perception and sensation remain entire. And, on the "other hand, that the muscles shall sometimes exert "prodigious strength, while the senses are all locked up. That the spirits should be transmitted "from the brain by one sect of nerves, and returned by another, seems well to accord with the known "laws of circulation."

It also appears reasonable to suppose, that the spirits returning to the brain should move in a distinct channel, otherwise an interference must take place, between the portion moving outwards to the extreme parts, and that which was returning to the brain; which would create confusion. It is also reasonable to suppose, that the spirits returning to the sensorium, convey an intimation of the impressions received from external objects in a distinct manner, and that the mind should transmit a quantity of spirits to the parts affected, proportioned to the sensation excited in the brain by the refluent spirits. This will undoubtedly be the case, as long as the impressions are moderate and create no distress; but when they exceed what is natural, or the part used

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to bear, then will the spirits rush in a preternatural quantity to the part affected, rendering it more irritable; and, in consequence of increased irritability, a continuation of the impressions will produce more acute sensations, the spirits will be returned to the brain with greater velocity, creating still stronger sensations. Thus, by a reciprocal communication of painful impressions and acute sensations, will a splinter of wood, lodged under a toe nail, produce the most terrible convulsions, which frequently terminate in death.

BUT, as regular perception and sensation depend on the moderate impressions made on the organs of sense, and conveyed by them to the brain; and muscular strength depending as much upon the quantity of the spirits transmitted to the muscular fibres; it will be easy to perceive, why the cause which increases muscular motion and strength should diminish regular sensation and perception; and vice versa, it frequently happens, that those who die consumptive, retain the use of their reason to the last moment of their lives. And it is also observable, that persons in a raging fever, attended with delirium, are so strong and active, that a strong man shall scarcely be able to keep them in bed; and, in one hour after, when the fever and delirium abate, the patient recovers the use of his reason, but is then so weak that he cannot turn himself in bed without assistance. Madmen are invariably stronger than they were before they lost the use of their reason. I have known a strong healthy man, who would faint whenever he saw another person bled, which must have

have been caused by disturbing the regular motions and operations of the spirits; from which it is evident, that all animal sensation and motion of every kind, is owing to the energy of the spirits transmitted from the brain, by the nerves, to the moveable fibres and living solids.—In voluntary motions, the spirits are transmitted to particular muscles or organs by an act of the *will*; in consequence of this influx, the members are invigorated and actuated, to perform those actions that are dictated by the *will*. For if the spirits cannot be transmitted from the brain to the fingers of a musician, he might will to play many tunes, without being able to play one. When the spirits are deficient in quantity, of a bad quality, or cannot be transmitted to a particular part, an old lecher may wish to enjoy a fine woman, but cannot raise a perpendicular, and must fail in the attempt.

BUT if we suppose a vigorous young man, full of spirits, to have made an assignation with the wife of another person, and at the very instant, when every article and *thing* was in the best condition for an amorous engagement, the enraged husband should appear, armed with a blunderbuss, to blow out the aggressor's brains, how long is it probable that matters and *things* would *stand* as they were a few seconds before? Would not the spirits desert the *parts*, like a flash of lightning, and leave every *thing* as flacid as they had ever been?

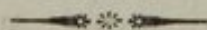
THE natural and healthy involuntary motions, depend upon the regular, equable transfusion or distribution of the spirits to every part of the body, and
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their regular uninterrupted return to the brain. As long therefore, as this continues to be the case, no pain, spasm or uneasy sensation will be felt; but when from any cause, the spirits are vitiated in quality, deficient or redundant in quantity, the solids injured in their contexture, or any cause acting, which affects the mind to any great degree, then will the spirits be disturbed in their motions, and distributed in an irregular manner, causing various complaints, such as pain, anxiety, spasm, fever, tremors, mania and convulsions of various kinds and degrees. In inflammatory fevers the spirits are redundant, and too active. In intermittents they are vapid and inactive. And in contagious fevers, contaminated with the infectious miasmata. It appears to be an invariable law of the animal economy, that whenever any part of the body is stimulated to an unusual degree, a quantity of spirits will be transmitted from the brain to the part affected, proportioned to the sensation communicated to the sensorium, from the injured member or organ: by this means the irritability of the bronchial vessels of the lungs is increased, until that convulsive agitation termed a cough, is produced, which sometimes expels the irritating matter; but it often happens, that the offending matter cannot be dislodged, in which case, after the patient has coughed a number of times, the irritation ceases, although the cause remains; because some part of the spirits are dissipated, and the remainder dispersed throughout the system, by the violent concussions of the lungs. The patient now gains a respite, until the spirits are again accumulated; for, if the spirits were not dissipated, the offend-

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ing matter still remaining, would render the cough incessant, and the unhappy patient would expire in the first attack, provided he could not expel the stimulating matter, which can be but seldom done : by this means the fœtus is excluded, the urine and fæces are expelled, sneezing and vomiting produced, the penis erected when necessary, and permitted to lay supine in common. It frequently happens that such a quantity of spirits are suddenly transmitted to a remote muscular part, as to produce a violent cramp and constriction, so as to obstruct or retard, the reflux of the spirits to the brain. Some part, in this case, is dissipated ; and, as the spasm relaxes, the remainder is returned to the sensorium in such a gentle manner as to excite no further commotion—the part being now left in a perfect state of ease, that a few seconds before, suffered the greatest extremity of pain. This is frequently the case in common cramp, the spastic tooth-ach, the spasms of hypocondriacs, and in painful hickups ; in all which cases, it is observed, that any very serious sudden alarm or fright, will dispel their pains in an instant, by calling off the spirits from the part affected, to be otherwise employed. In many of these cases, the pains are felt no more, and never in any case, until the spirits are accumulated in the part, in a preternatural quantity.



VIS MEDICATRIX NATURÆ.



THIS law of the animal economy, by which the spirits appear to fly, as it were instinctively, to the
part

part affected, is often productive of the most salutary effects, especially in cases where obstructions are forming, or acrid matter accumulating in any weakened part of the system : by this means the irritability and strength of the part is increased, the viscid juices attenuated, and an increased circulation through the vessels of the affected part promoted, to carry off the offending matter. This is the means by which the unassisted powers of nature encounter and remove the diseases to which the human species are obnoxious ; and is, with propriety, termed the *Vis Medicatrix Naturæ*. When any part is weaker than the rest, it is enlivened by an increased flow of spirits, and rendered more tense and active, by an increased circulation of blood through its vessels : if viscid fluids have stagnated, they will be attenuated and set in motion by an increased degree of heat, and agitation of the fluids ; if the fluids are salt or acrid, a fever will be produced, which will excite the patient to drink more freely than usual ; the offending matter will be diluted, and carried off by sweat and urine, and frequently by an increased perspiration only.

By this same law, we are enabled to call off the spirits by way of revulsion, when they are redundant or over active in any part, by the application of smart stimulants to a remote part of the body. A paralytic member is frequently stimulated with nettles, to excite a flow of spirits to the feeble member. When a Turkish physician is called to a patient afflicted with a cholic, if the pain cannot be soon abated by the remedies commonly prescribed in such cases,

cases, they apply a red-hot iron to the sole of one of the patient's feet, and the pain in the bowels vanishes immediately. I have known people succeed in their attempts to cure the tooth-ach, by applying a red-hot wire behind the ear on the affected side; as they supposed by destroying a nerve, which they imagined led to the teeth, although they never passed the wire through the skin. Thus we find that pain is caused by a too great accumulation of spirits in any part that is susceptible of irritation, and not in all cases, as has been supposed, by such an extension of the fibres of a muscle, that they are nearly on the point of breaking; as it is very improbable that the fibres of the internal parts of the body, ever suffer such a degree of extension as to create pain, unless they were previously in a state of inflammation and tumifaction; and as improbable that the fibres of a muscle almost broken, and in the greatest extremity of pain, should in the next moment, be free from every uneasy sensation whatever. But, if a person be seized with severe internal pain, who has a rich dense blood, highly replete with spirits, (which constitutes the inflammatory diathesis,) the spirits will fly to the part affected, in a preternatural quantity, producing extreme heat and inflammation internally, while the external surface of the body is cold and pale, caused by a colapsion of the minute vessels on the surface of the body. This chill in inflammatory diseases is of short duration, and has been ascribed by some authors of great eminence, to a general spasm on the surface, or in the extreme arteries. But with due deference to such great characters, I conceive these effects are produced by the
spirits

spirits in a degree deserting the extreme parts, and accumulating in a preternatural quantity, in the part affected with pain; in consequence of which, the natural heat of the surface of the body must be diminished, the blood and lymph rendered less fluid, being in a great degree deprived of that animating principle, by whose agency alone the fluids are propelled through the minute vessels on the surface. But, when the great advocate for spasm on the surface of the body in fevers comes to take a serious review of the doctrine, he candidly confesses the great difficulty (he might have said impossibility) of explaining how *atony* and *spasm* could subsist in the same vessels, at the same time; as he knew that *atony* was caused by a diminution of the energy of the brain, and must also have known, that *spasm* was caused by a redundance of spirits present in the part affected, while other parts were deprived of their natural quantity; for, if all the parts of the body are equally supplied with spirits, the action of each muscle will be equally balanced by its antagonist, and, consequently, there can be no spasm.—As one error is generally productive of another, the same great physician undertakes to correct the mistakes of those authors, who have taught, that lentor or viscosity prevailing in the fluids, and stagnating in the extreme vessels and pores, was the cause of the cold stage of intermitting fevers and its consequent symptoms; and observes, that there is no evidence of any such viscosity previously subsisting in the fluids.

BUT, if heat and motion are the sole causes of fluidity, and most remarkably so in the human blood
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and lymph, that are as unfit, when cold, to be circulated through the minute vessels of the brain and lungs as fluid tar would be, no reasonable doubt can be entertained, that their fluidity will be diminished in exact proportion to the diminution of the natural heat of the body, and consequent slow or languid circulation through the vessels, when both *action* and *re-action* are greatly diminished. I think we have abundant reason to conclude, that the blood and lymph may be so inspissated, as to obstruct perspiration, and even to hesitate in the extreme branches of the capillary arteries on the surface and extremities of the body. And so universally is it known and acknowledged, that heat has a tendency to attenuate the fluids, that every judicious physician will order his patients in putrid fevers, and the confluent small-pox, to be kept cool, to preserve the crassis of their blood, and prevent its farther dissolution by heat.— Since both reason and experience conspire to convince us of the existence of lentor, or a preternatural degree of viscosity of the fluids, which may stagnate or hesitate in the extreme vessels on the surface and extremities, and so produce a chill or cold fit in fevers, we must believe, and continue to propagate this doctrine, until we are well assured from actual experiments that heat and motion are not necessary to produce and continue fluidity: Or, that the heat of the body of a debilitated invalid, is at all times equably diffused throughout the system, and uniformly equal to the healthy standard; even when he is exposed for hours, to a cold, damp night air, or travels in a rainy day in the month of December. But if this is not the case, and if *fluidity* depends
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upon *heat* and *motion*, we are constrained to believe, that his fluids will be inspissated, and perspiration obstructed by the viscid juices, which will produce a feverish heat, to attenuate the *viscid matter* which obstructed the pores: for, if perspiration were obstructed (as some have supposed) only by a constriction of the pores of the skin, it would be immediately restored by going into a warm room or bed; but we find this seldom to be the case; nay, it often requires the exhibition of warm diluting drinks, the use of warm baths, and attenuating stimulating remedies, to be continued for some days, before the matter which obstructed the pores, can be attenuated and removed. I have known cases in which perspiration had been obstructed for a long time, where the first sweats that appeared, were almost as viscid as glue, and gave the linen a considerable degree of stiffness. I have also known sweats that were evidently clammy or greasy, and that in a very profuse quantity, and continued for many days: besides, it is not uncommon for patients at the termination of a fit of intermittent fever, to emit urine having the appearance of soap-suds. If these viscid juices were not in the fluids, or stagnant in the cellular system, from whence were they derived? But it is highly improbable, that even strong astringents applied to the skin of an healthy person, would constrict its pores for any length of time, so as to obstruct perspiration: as I once knew an healthy man, who, to cure the common itch, washed his body all over with a solution of copperas in water, that was strong enough to burn his shirt to rags, without obstructing perspiration:—It is therefore evident, that obstructed sweat
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and perspiration, are more frequently caused by the inspisation of the fluids, than by any supposed constriction of the *pores* by cold: it is heat alone, which renders it so fluid, as to reduce it to an invisible vapour, fit to pass through the pores of the skin, and carries it off with it, as it leaves the body; by which means the natural heat of the body is preserved, and in general prevented from being raised much higher, or sinking much below the 96th degree of Fahrenheit's thermometer; which is esteemed the healthy standard. If an healthy person uses smart exercise, he soon begins to grow too warm, until an increased perspiration takes place all over his body, by which means he is freed from that redundant quantity of fire, which would raise the heat to an intolerable degree, for every particle of moisture which evaporates from the whole surface of his skin, is buoyed up, and carried off by a fiery atmosphere. But if, on the contrary, the heat of the body is reduced below the healthy standard, the perspirable matter will be retained, whereby the heat will be increased, until the matter which obstructed the pores is attenuated, and an extra quantity of fire accumulated, to carry it off: thus the due degree of heat in the human body is maintained; and this is clearly an operation of the *vis medicatrix*. But it often happens in very weakly people, especially to the hypochondriac and hysterical, that the heat of the body is very unequally distributed, which probably proceeds from the following causes, to wit: The circulation being languid, and digestion but ill performed, the spirits cannot be sufficiently elaborated, the patient will be chiefly supplied by the quantity taken in from the
air

air in respiration, which are more *active* but less *permanent*, than the other kind. Vitiated juices will accumulate in the system, and by stimulating various irritable parts, will cause a revulsion of the spirits to the part affected, and consequent rapid circulation and heat; while the parts deserted by the spirits will be cold and pale. Thus an hysteric patient will have her face flushed, and almost burning, and her feet and ankles as cold as those of a dead person: they are often afflicted with violent pains and spasms, owing to the same cause.

BUT the question may be asked, why is not a part that is affected with a violent cramp, heated to a great degree during the time of the spasm, which is said to be caused by a redundance of spirits in the part? I answer, that the violence of the contraction and constriction obstructs circulation through the vessels, and by that means prevents the generation of heat: besides, invalids who are most subject to cramps, have but a scanty supply of spirits; so that, if they be greatly redundant in one part of the system, they must be deficient in other parts: like a large fortress, garrisoned by a few men; if one part of the wall be well manned, the other parts must be left unguarded.

VINOUS FERMENTATION.

HAVING asserted in the preceding part of this work, that a process in many respects analogous to vinous

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fermentation,

fermentation, was carried on in the stomach of an healthy animal, which might properly be termed alimentary fermentation, whereby a quantity of spirits was separated from the air and ingested aliments, to be mixed with the chyle, &c. I conceive it to be necessary to establish this fact. But in order to convey any tolerably adequate idea of the process of vinous fermentation, it will be necessary to observe, that good atmospheric air is so replete with the electric fire, that it is an electric *per se*, and if it be sufficiently dry, will neither receive any addition nor transmit the fluid as a conductor. And then endeavor to explain the manner in which the electrical part of the air is taken into, and combined with the saccharine part of the liquor in vinous fermentation.— It is evident by what may be discovered every day, both in breweries and distilleries, that the *electric part* of the air has a greater affinity with, and tendency to unite with the *saccharine* part of the liquor, than *fixed air* has; and, therefore, as soon as fermentation is begun in the liquor, (which certainly contained no spirits,) we immediately perceive, that great quantities of fixed air are extricated, rise to the surface, and are expelled; while a quantity of the electric part of the *air*, (or what the French chymists call the caloric principle) is taken into, and combined with the saccharine part of the liquor, until it is saturated; that is, until there is as much spirit taken in, and combined with the sugar contained in the liquor, as it can retain, so as to prevent this fugitive principle from escaping. The conflict and ebullition which take place in this process, from expelling fixed air, and taking in spirit, constitute what is termed

termed vinous fermentation ; which is the only means as yet discovered, whereby spirits can be collected from the air, and united with watery liquors. But when a vinous liquor thus obtained, is in the highest state of perfection, if it be set in a warm place, and the air again admitted, a second fermentation begins, which is termed *Æctous*, in which process the spirits are all expelled, and fixed air taken in, converting that which had been a vinous liquor, containing spirits, into an acid liquor, called vinegar, perfectly divested of inflammability.

BUT as my design in explaining the nature of vinous fermentation, was intended only to show from whence, and by what means, spirits were collected for common purposes ; and thereby to convey some idea of alimentary fermentation, by which means, spirits are collected in the stomach of an healthy animal, for the purposes of the animal economy, I shall proceed to consider

DIGESTION

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ALIMENTARY FERMENTATION.

THE establishment of this doctrine appears to me, to be of the utmost importance in physiology ; and although it has been controverted by many anatomists and physiologists, I think it is incontestibly proved, by the experiments of Spalanzani and Doctor Stevens ; who caused different animals to swallow small spheres of silver, perforated with small holes, which

which were filled with beef, pork, cheese, roasted turkey, &c. the contents of which, when they were evacuated, had been so perfectly digested, that the spheres were found quite empty ; which never could have happened, if an active fermentation had not taken place in the enclosed mass, by which an elastic repulsive gas was generated, by whose action the constituent particles of the meat, &c. were dis-united, their cohesion broken and attenuated, so as to pervade the small perforations in the spheres. This change could not be effected by the muscular action of the coats of the stomach, because their contents were defended by the spheres. It could not be effected by simple maceration, or by imbibing an inactive fluid ; for, the texture of bodies cannot be dissolved, without changing the situation of the particles of which they are composed. But, in the present case, the cohesion of the parts were not only broken down, and resolved to a very fluid consistence, but protruded through the small pores in the spheres, by some very active fermentatory process, so as to leave the spheres quite empty.

It appears to be generally believed, that vinous fermentation is the only process yet discovered, by which spirits can be obtained from the air, and combined with fluids. If, therefore, it can be shown, that an inflammable spirit is separated from the air and ingested aliment in the stomach of animals, it will establish the fact, that a fermentation, in some respects similar to the vinous, is carried on in the process of digestion.

To

To prove this fact, I shall again quote the Compendium, Page 74, Vol. II. in the words of the celebrated author, viz.

“ The Anatomical Lecturer at Pisa, &c. in the year
“ 1597, happening to hold a candle near the subject
“ he was dissecting, on a sudden set on fire the va-
“ pours that came out of the stomach he had just
“ opened. In the same year, as Doctor Ruysch,
“ then Anatomy Professor at Pisa, dissecting a wo-
“ man, a student lighting him with a candle, he had
“ no sooner opened the stomach, than there issued
“ out a yellow greenish flame. A like thing hap-
“ pened some years after at Lyons in dissecting a
“ woman : her stomach was no sooner opened, than
“ a considerable flame burst out and filled the place.
“ But this is not so much to be wondered at, since
“ the experiments made by Doctor Vulpari, Anato-
“ mical Professor at Bologna. He affirms that any
“ one may see issuing from the stomach of an ani-
“ mal, a matter that burns like spirits of wine, if
“ the upper and lower orifices of the stomach are
“ tied with a very strong thread. The stomach thus
“ tied, must be divided from the æsophagus and
“ duodenum above and below the ligature, and then
“ pressed with both hands, so as to make all that it
“ contains pass to one side ; this will produce a swel-
“ ling in that part which must be held by the left
“ hand to hinder its escaping ; a candle then being
“ held about half an inch from the stomach, let it
“ be suddenly opened by the right hand, and a bluish
“ flame will immediately gush out, which will some-
“ times

“ times last a minute. In the same way flame may
“ be brought forth from the intestines also.”

As I am convinced by experience and observation, that many diseases both acute and chronic are caused by a contamination and vitiation of the gastric ferment, I have long wished for a more intimate knowledge of its nature and qualities, in animals enjoying perfect health : for this purpose, I wish our chymists to analyze the gastric juice of different animals, both of those who are slaughtered, or are killed by accident, in a previous healthy state, and those who die diseased : and also to try its effects on various fermentable mixtures, in a heat equal to that of the human stomach, but without agitation or communicated motion. For this purpose, the rennet of a calf is easily procurable, and might be tried in a solution of sugar in water, or subacid vegetable juices, and also with dough in making bread.

AND the gastric juice of fish and carnivorous animals, might be tried with such alimentary mixtures, as were used by Spalanzani and Stevens, in a heat equal to that of the stomach. Perhaps the best mode of trying these experiments, would be, to enclose the mass in the bladder of an animal, previously soaked, and well washed in warm rain water, and suspended in water, the heat of which might be regulated by the thermometer, and the experiments might be conducted so as to admit or exclude the external air, at pleasure, as it might be found necessary. As vinous fermentation will not succeed, if the external air is excluded, it is not improbable that alimentary
fermentation

fermentation may also require the admission of air. This might be easily effected by fixing the neck of the bladder, with a small silk cord, so that it might be either pursed up, or dilated at pleasure: or, if a clear oil betty could be perfectly cleansed from the oil with lime-water, it would be better, on account of its transparency, as a person might discover the changes, as they occurred in the mixture, or mass. But to chymists who are provided with a proper apparatus, these hints will be useless.

WE are well informed, by the experiments that have been made, and by the practice of some Indian nations, that saliva is a pretty active ferment. But I suspect that the gastric ferment is much more powerful, especially in its action on a greater variety of substances to dissolve their cohesion, and reduce them to an uniform soft fluid consistence, denominated chyle.

THERE will be a greater or lesser quantity of this spirit generated in the stomach and intestines, according as the subject was more or less healthy. In putrid and nervous fevers it is deficient.—When this spirit is generated in due quantity, of a good quality, and properly united with the saliva, pancreatic juice, bile, the nutritious part of the aliment, and succus gastricus, or gastric ferment, it forms a chyle replete with an active elastic principle, which promotes its circulation, not only through the lacteals and thoracic duct, but throughout the whole system. With respect to the electric part of the air, which is separated from the fixed or mephitic part in respiration,

tion, and transmitted with the blood in the pulmonary vein to the left ventricle of the heart, and from thence diffusing itself throughout the whole system; I shall again quote the observations of the author of the Compendium of Natural Philosophy, Fol. 101. Vol. II. where he says—
“ From a thousand experiments it appears, that
“ there is a fluid far more subtile than air, which is
“ every where diffused through all space, which surrounds the earth, and pervades every part of it;
“ and, such is the extreme fineness, velocity, and
“ expansiveness of this active principle, that all other
“ matter seems to be the body and this the soul of the
“ universe. It is highly probable, that this is the
“ general instrument of all the motion in the universe. From this pure fire, which is properly so
“ called, the vulgar culinary fire is kindled; for, in
“ truth, there is but one kind of fire in nature,
“ which exists in all places and in all bodies; and
“ this is subtile and active enough, not only to be,
“ under the Great Cause, the secondary cause of motion, but to produce and sustain life throughout all
“ nature, as well in animals as in vegetables. This
“ great machine of the world requires some such
“ constant, active, powerful principle, constituted by
“ its Creator, to keep the heavenly bodies in their
“ several courses, and, at the same time, to give
“ support, life, and increase to the various inhabitants of the earth. Now, as the heart of every
“ animal is the engine which circulates the blood
“ through the whole body, so the sun, as the heart
“ of the world, circulates this fire through the whole
“ universe. And this element is not capable of any
“ essential alteration, increase, or diminution; it is a
“ species

“ species by itself, and is of a nature totally distinct
“ from that of all other bodies. That this is abso-
“ lutely necessary both to *feed* common *fires*, and
“ sustain the life of animals, it seems may be learn-
“ ed by an easy experiment.

“ PLACE a cat, together with a lighted candle, in a
“ cold oven, then lute the door close, having fixed a
“ glass in the middle of it ; and if you look through
“ this, you may observe at one and the same instant,
“ the candle goes out, and the animal dies—a plain
“ proof that the same fire is needful to sustain both
“ culinary fire and animal life ; and a large quantity
“ of it is required ; some doubtless pervades the oven
“ door, but not enough to sustain either flame or
“ life.

“ INDEED every animal is a kind of fire-engine.
“ As soon as the lungs inspire the *air*, the *fire* min-
“ gled with it is instantly dispersed through the pul-
“ monary vessels into the blood ; thence it is diffused
“ through every part of the body, even the most
“ minute arteries, veins and nerves. In the mean
“ time, the lungs inspire more air and fire, and so
“ provide a constant supply : the air seems to be
“ universally impregnated with this fire, but so dilut-
“ ed as not to hurt the animal in respiration. So a
“ small quantity of a liquor dropt in water, may be
“ friendly to an human body, although a few drops
“ of the same liquor given by themselves, would
“ have occasioned certain death ; and yet you can-
“ not conceive one particle of the water, without a
“ particle of the medicine. It is not impossible,
“ that

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“ that this may be one great use of the *air*, by ad-
“ hering so closely to the elementary fire, to temper
“ and render salutary to the body, what would
“ otherwise be fatal to it. But to put it beyond dis-
“ pute, that this fire is largely mixed with the air,
“ you may make the following experiments: Take a
“ round lump of iron, and heat it to a degree called
“ welding heat; take it out of the fire, and with a
“ pair of bellows, blow cold air upon it, the iron
“ will then as effectually melt, as if it were in the
“ hottest fire: now when taken out of the forge, it
“ had not fire enough to conquer the cohesion of its
“ parts; but when this fire is joined with that which
“ was mixed with the air, it is sufficient to do it.
“ On the same principle, we account for the increase
“ of a coal or wood fire, by blowing it. And let
“ none wonder that fire should be so connected with
“ air, as hardly to be separated; as subtile as fire is,
“ we may even by art attach it to other bodies, yea,
“ and keep it prisoner for many years, and that either
“ in a solid or fluid form: an instance of the first
“ we have in steel, which is made such, only by im-
“ pacting a large quantity of fire into bars of iron;
“ in like manner we impact a great quantity of fire
“ into stone, to make lime. An instance of the
“ second kind we have in spirits, wherein fire is im-
“ prisoned in a fluid form; hence common spirits
“ will burn all away: and if you throw into the air,
“ spirits rectified to the highest degree, not one drop
“ will come down again, as it will be all absorbed
“ by the air.”—Besides these facts already quoted,
there are others which will tend also to prove that the
animal spirits are a modification of the electric fluid,
by

by its acting in a surprizing degree as a substitute for the nervous fluid. W. C. a lad of about eleven years of age, had the organs of speech so much affected by a paralytic complaint, that he could scarcely pronounce a sentence intelligibly : but when he was insulated and electrized, he spoke distinctly and fluently : however, when he stepped off the seat, and the fluid had escaped from his body, the difficulty of speaking returned ; but by a frequent repetition, with a judicious exhibition of internal remedies, he recovered the perfect use of his speech. Electricity quickens the motion of fluids. If distilled rain water be caused to pass through a capillary glass tube, so extremely small in the bore, that one drop only will pervade the tube in a minute, if it be electrized, the water will flow through it in a continued stream, which then glitters in the dark, the fire appearing to be intermingled with the water. It accelerates the motion of the human blood, quickens the pulse fifteen or sixteen strokes in a minute : the blood that flows from the veins of one electrified, glitters, separates into small drops, and spouts out considerably farther than otherwise it would do.

As I have endeavored to explain the manner in which spirits are collected in vinous fermentation from the air, and united with the saccharine and aquaous part of the liquor ; and also just hinted, that the spirits were again separated from the vinous liquor, in acetous fermentation, and delivered to the air from whence they were at first received, and a quantity of fixed air taken into the liquor, on which its acidity entirely depends ; it is also necessary to explain

explain the nature of putrefactive fermentation, and its consequences in the human body.

BUT in order to understand its mode of operation, it will be necessary to observe,

1st. THAT *fixed air* is composed of *water* and *nitrous acid* united to an earthy basis, and constitutes one of the ingredients in both our solids and fluids ; which was supposed by the celebrated Dr. M'Bride, to be the vinculum, or bond of union among the particks of which our bodies are composed.

2d. THAT the putrefactive ferment, is of an alcalescent or volatile nature, and therefore has a great tendency to unite with acids.

3d. THE gastric ferment is of a subacid quality, approaching to the nature of the vinous ferment, in some degree ; but appears to be much more powerful in acting upon, and destroying the cohesion of various substances subjected to its operation.

4th. THE electric part of the air, has a great tendency to unite with subacid liquors in vinous fermentation---with the nitrous acid in the formation of nitre ;---but it has also a tendency to unite with alkaline and calcarious substances, as lime-stone, charcoal, &c. This being the case, if a person who has been confined in an air that has not a free circulation, or that has been frequently inspired by himself or others, by which the nitrous acid has been neutralized, and the electric part of the air exhausted by frequent

frequent inspirations, and the subacid gastric ferment almost destroyed, or greatly vitiated by living on tainted provisions, the putrid ferment begins its action by uniting with the earthy part of the fluids, and changing and volatizing the fixed air. The powers of digestion, now weakened, or almost destroyed; chyle, replete with spirits, can no longer be generated. A great languor and extreme debility seizes the unhappy patient; the lymph is now deficient in quantity, and vitiated in quality, being both viscid and acrimonious, for want of a fresh supply. The fire in the body now acts like the naked undiluted element, almost burning and consuming the parts it used to invigorate and cherish, when united with the lymph and other healthy fluids; and now being joined with the putrefactive ferment, in rarefying and expelling the fixed air from the fluids, that agitation and intestine motion amongst the insensible particles, is what is termed putrefactive fermentation, which destroys the crasis of the blood, dissolving it to such a degree, as to pass through the pores of the relaxed vessels, until it arrives at the cuticle, staining it with red, black, or purple spots. The heat of the body, on the two or three first days, is generally excessive, although the pulse be neither strong, nor remarkably frequent; being caused entirely by the *intestine*, and not by the increased progressive motion of the fluids. If an healthy person applies his hand to the skin of one in this stage of a putrid fever, the heat of the patient's body appears to be intolerable; although the patient himself complains of feeling cold, if the air is not very warm indeed. This sensation of cold, while the heat of the patient's body is greatly above
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the healthy standard, may be explained, by what is frequently experienced with respect to springs, to wit: If a person in January immerse his hand in a good spring, it feels quite warm; but if he does the same in June, when greatly heated with exercise, the coldness of the water will cause him to shiver. Again, should a person expose one hand to a current of extremely cold *air*, and immerse the other in water heated to the 120th degree of Farenheit's thermometer, about one minute, and then plunge them both into water heated to about 70 degrees, it would feel warm to one hand, and cold to the other. But the sensation of cold in this fever, and that which is felt in the first stage of intermittents, depend upon very different causes, which I may probably endeavor to explain at some future period.

HAVING formed the above theory of putrefaction, upon reading Doctor M'Bride's experiments, and the practice of the London hospitals about the years 1767 or 1768; M'Bride's experiments and reasoning induced me to believe, that fixed air was an essential ingredient in our bodies, and that it was expelled from the body by putrefaction: and constant experience had taught me, that animal substances, in a state of putrefaction, were dissolved and converted into an incoherent pulp, and dissipated in a putrid volatile effluvia—and by perusing the practice of the London hospitals, I found a poultice of stale beer grounds and oatmeal recommended to stop the progress of mortification; I therefore tried its effects in a case where the foot and ankle were mortifying very rapidly, and, finding that it checked it in some degree, I
began

began to enquire by what quality in the stale beer grounds the progress of the mortification was checked. I conjectured, that it was owing to some degree of the vinous ferment still remaining in the grounds. In consequence of this opinion, I resolved to apply yeast; and, to give it a fair trial, a poultice was made with the addition of wheat-bran only. The first poultice was applied about twelve of the clock in the day, and renewed at bed-time; and, by morning, the progress of the mortification was stopped. In a few days the mortified parts separated, and the patient recovered perfectly.

AFTER having tried the power of the yeast alone, I added myrrh reduced to a paste, and the powder of the Peruvian bark, which I found to be a good auxiliary, and think it ought not to be neglected in desperate cases.

FROST BROUGHT OUT

BY

SPRING WATER.

IN 1782, the yeast was applied with success, in about 80 cases of mortification, which succeeded the action of severe frost; the feet in many cases being frozen to such a degree that the patients lost many of their toes. But this evil might have been prevented, by immersing the frozen members in spring water, for the space of half an hour, before the patient

tient was permitted to come to the fire, or to have his frozen members thawed by any other means. Even in a case where the frost had penetrated to the bones of the feet, and the flesh and skin were as hard as a frozen turnip, I ordered the patient to put his feet into spring water, which brought out the frost that formed a complete covering of ice all over his feet; and after the first was broken off, a second coat succeeded, which was also removed; and next day the feet of the patient were in all respects perfectly well.

IN the year 1778, being fully convinced, by the experience of ten years, of the efficacy of the vinous ferment, in conquering the putrefactive, when externally applied, I had the following opportunity of trying its effects, given internally, in the last stage of a putrid fever:--Doctor Matthew Maus, one of the junior surgeons belonging to the hospital at Albany, being sent to Cherry-Valley to examine those who were wounded when Colonel Alden was killed, returned to the city much fatigued by a journey of above eighty miles, in consequence of which he was excused from duty for some days. The putrid fever being rife, he caught the infection, and was seized in a violent manner from the first attack. I saw him first about ten of the clock in the forenoon, and found him speechless and senseless; his eyes glazed and without motion; and his tongue very black and exceedingly foul. I was told he had been taking the Peruvian bark and wine, which appeared to have had but little effect in restraining the violence of his disease. In these deplorable circumstances, I resolved to exhibit

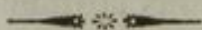
hibit the yeast internally, being firmly persuaded, from what I had frequently experienced, that two ferments, of a nature diametrically opposite to each other, could not long exist together, and continue to produce their contrary effects, but the strongest or more active would gain the ascendancy. The only circumstance which I dreaded, was, lest the active fermentation, produced in the stomach, would extricate such a quantity of air, as to inflate it and the intestines, so as to produce those direful effects, said by some physicians to be produced by the gas Sylvestre; however, as I was convinced, that if the putrid ferment was not speedily conquered, he would expire in a few hours, I resolved to make the experiment with as much caution as possible, carefully attending to the effects of the yeast, of which I procured a pint of the best kind; with which I cleansed his tongue, teeth and fauces, washing off a prodigious quantity of putrid sordes, which adhered to them like bird-lime; and then gave him two table spoonfuls of the clear yeast, which he swallowed with difficulty. I called again to see him, in about two hours, examined his stomach, and found it was not inflated; cleansed his mouth as before, and gave him a small wine glass full of the yeast: before night he recovered his speech; he took the whole of his yeast during the night, and by next morning had recovered the use of his reason. He then took the following remedy to strengthen him, and subdue the remaining putrefaction, viz. Peruvian bark, six drachms; Virginia snake-root, two drachms; boiling water one pint; let it be drawn like tea, sweeten it with sugar, and when it is about milk warm, add

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three

three table spoonfuls of the best yeast. After fermentation begins, give from one table spoonful, to three or four every second or third hour, according to the age of the patient and urgency of the symptoms.

By persevering in the use of this remedy, and taking wine as a cordial, he recovered perfect health. But here it may be of importance to observe, that neither the bark, snake-root, wine, or any other cordial or stimulant, should be given on the first days of the fever, while the heat is excessive, but trust to the yeast alone, which resists putrefaction most powerfully, without increasing the heat. Bleeding and blistering, produce the most pernicious effects in this disease; the first, by weakening the patient, diminishes the progressive motion of the fluids, and paves the way for that intestine or fermentatory motion, which destroys the crisis of the blood; and the second, by the known quality of the flies, to attenuate viscid juices, by means of their acrid stimulating, and I might add putrescent salts, will only act in aid of the putrid ferment, to dissolve the fluids to a greater degree.



CYNANCHE MALIGNA.



THE above antiseptic decoction, or rather infusion, is also exceedingly efficacious in the cynanche maligna, or ulcerous sore throat, and should be used with the same precaution as in a putrid fever, i. e. if the feverish heat is much above the standard of health, the yeast must be exhibited alone, until the heat abates, and then give the infusion as above directed,
using

using the following gargarism frequently, viz. Seneca snake-root and crude sal ammoniac, of each two drachms; boiling water, one pint; draw it like tea, strain it off, and sweeten it with honey; but if the ulcerations are very foul and deep, two drachms of myrrh may be reduced to a paste, and added to the gargle, or half an ounce of the root of the sharp-pointed dock.

An Attempt to explain the causes of Intermittents.

THE causes which conspire to produce a fever of the intermittent kind, are,

1. A vitiated digestion, or alimentary fermentation.
2. A scanty supply of animal spirits.
3. General debility, in consequence of such deficiency.
4. A diminution of the natural heat of the body.
5. An inspisation of the fluids, in defect of heat and motion.
6. Obstructed perspiration, caused by inspisation.
7. A diminished circulation through the vessels on the surface.
8. The cold and pressure of the air, on the torpid extremities.
9. Marsh effluvia, and low damp situation.

DIGESTION may be vitiated in a variety of different ways; and it appears probable to me, that the greatest number of chronic diseases depend on a vitiated alimentary fermentation as their cause. The defect

defect which is most calculated to produce intermittents, is that which generates a scanty supply of vapid inactive spirits; the inevitable consequence of which must be, a general languor and debility: in consequence of which, there will ensue a slow weak circulation, and diminished natural heat of the body. But if fluidity depends upon heat and motion, then the juices in the system must be *inspissated*, in exact proportion to the diminution of the heat and motion; and as it is necessary that the perspirable matter should be in the highest state of attenuation, even reduced to an invisible vapor, to render it transmissible through the invisible pores of the skin, it must follow, that perspiration will be obstructed by the inspissated matter, without recurring to *spasm*, to explain every morbid affection. The pores of the skin may be diminished in size, on the approach of the cold fit of an intermittent, but not by spasm, which is caused in all cases, by a redundancy of spirits present in the part affected. But, in the present case, it is evident, that the spirits are deficient on the surface and the extremities, and redundant internally, causing an almost intolerable degree of *heat*; even in the cold stage, the patient longs and prays for cold water, to assuage the excessive internal heat, while he is almost chilled to death, with the sensation of cold externally, because the spirits have, in a great measure, deserted the external parts; the circulation of the warm blood from the centre, will be greatly diminished in the extremely minute vessels on the surface; vast numbers of these, for want of a due supply of their proper fluids, will remain for some time in a state of collapsion, being at the same time

time compressed by the superincumbent weight and elastic spring of the atmosphere, when they are in a torpid state, and divested of their power of resistance and re-action. When a person so predisposed, as above stated, comes to breathe air impregnated with the putrid exhalations from a marsh, it is not to be doubted, that he should be greatly debilitated by it, especially if he is at the same time obliged to live on low damp ground, which has a great tendency to rob the body of its due degree of heat.

It has been observed, in the preceding part of this work, that good atmospheric *air* is composed of water, nitrous acid, earth and the electric fluid: that, in respiration, the electric part of the air is conveyed by the pulmonary vein to the *heart*, to invigorate and enable it to perform its incessant uninterrupted action, from infancy to old age: that it generated and maintained the heat of the body, and was the agent by whose activity and power the fluids were circulated through the cellular system, the lymphatics, the lacteals, and the extremely minute vessels that were farthest removed from the force of the heart. Numerous experiments and observations evince, that the electric fluid is not only more abundant, but much more active, in the upper regions of the air than it is below; and, consequently, the air is more pure and active on high dry grounds than in low, wet or marshy places: besides, if the nitrous acid be an essential ingredient in good air, we certainly know that a corrupt volatile marsh effluvia will change its properties and render it effete. Hence, a person so predisposed, who may inspire such an *air*,
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will soon be affected with languor, debility, inactivity and sluggishness ; “ the face and extremities become pale, the features shrink, the bulk of the external parts are diminished, and the skin all over the body appears constricted, as if by cold. The coldness of the extremities may now be perceived by another person, although the patient himself takes little notice of it.” This is so far the enumeration of the symptoms as detailed by Dr. Cullen, to which might be added sickness, nausea, and anxiety.

THESE being the symptoms which occur in the cold fit of an intermitting fever, by which it is manifest that the blood and spirits have, in a great measure, deserted the minute vessels on the surface of the body, and are accumulated in the internal parts. This I believe will admit of no dispute. The whole difficulty appears to be, to determine, whether these morbid appearances and distressing sensations are caused by an universal *spasm* on the surface of the body ; or, whether they are not caused by the diminished quantity of spirits existing in the *system*, being recalled from the external parts of the body, by the means above recited, to act internally, and enable the debilitated powers of nature to counteract and overcome the many obstacles that now oppose themselves to the operation of the heart. For, when the heart begins to feel the oppression of the accumulating fluids, it will act as a stimulus, which will cause the spirits to flow to the heart by a law of the animal economy, which I have endeavored to explain in the preceding part of this work.

HAVING

HAVING already laid down what I suppose to be the predisposing causes of an intermittent fever, I will next endeavor to give a concise view of the disease in its different stages, and assign the causes of its intermission and subsequent attacks.

WHEN the animal spirits are deficient in quantity, and vitiated in quality, a general languor and debility will ensue—the circulation of the blood will be slow—the natural heat of the body will be diminished—the juices inspissated—and perspiration obstructed. If the patient, in these circumstances, be exposed to a damp cool air, or a low damp situation, it will rob him, in a great degree, of the small remaining heat. The finer fluids, in the external vessels and the extremities, begin to stagnate; the ends of the fingers appear livid, and grow cold; the warm atmosphere, that used to surround the body, is now gone. The vessels have now no energy, to withstand the weight and spring of the incumbent atmosphere, which acts upon them with a power equal to fifteen pounds on every square inch of the whole surface of the body, impelling the blood to the centre. The surface now appears pale and shrunk; rings, that before sat light on the fingers, will now drop off; the blood and juices being propelled to the heart, becomes an almost insuperable load, or obstacle to its operation, in its greatly debilitated state; it however labors on, until the blood acquires an amazing degree of heat, which creates an intolerable thirst, and inclination to drink cold water, even while they suffer the most severe sensation of cold externally. At length the heat begins to make its way to
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the surface and extremities, rarefying and attenuating the condensed inspissated fluids ; (for if heat and motion cause fluidity, certainly cold and rest must produce a contrary effect.) As the fluids become heated, attenuated, and protruded through the arteries to the surface of the body, the vessels are filled again with warm blood ; the skin, that before was shrivelled up, now becomes smooth and looks florid ; the pores are again opened, that were constricted by the contractile powers of the fibres of the skin, when the vessels were empty : for, the more a porous membrane or vessel is distended, the more its pores will be opened. The heat and motion being much increased, and the fluids rarefied to a great degree, an universal profuse sweat succeeds, to the great relief of the patient ; a quantity of the *inspissated matter*, that had been attenuated and fitted for expulsion, by an increased degree of heat and rapid circulation, is now separated and expelled both by sweat and urine ; by which means the preternatural heat of the body is diminished, and the fever intermits, although the *disease* be but partially conquered : for, the *spirits* being greatly exhausted, and, in consequence, the irritability of the system diminished, a truce takes place between the vis medicatrix and the disease ; but, as the patient is left in a languid condition, the circulation of the blood will be very slow ; the heat greatly diminished ; digestion much weakened ; crude vapid chyle generated ; the lymph and finer fluids inspissated ; obstructions formed in the extreme branches of the vessels and cutaneous pores ; a propulsion of such fluids as are moveable, in the extreme vessels on the surface, toward the heart, and consequent
collapse

collapsion of the vessels, and shrinking of the parts from whence the fluids are driven, by the pressure of the external air, and not by spasm; as nothing can be more evident, than that spasm is caused by a preternatural influx of spirits into the part affected; and that atony is caused by a diminished influx: so that it is as impossible for *atony* and *spasm* to exist in the *same vessels*, at the *same time*, as for the greatest possible degree of *heat*, and the most intense degree of *cold*, to exist in the *same substance* at the *same time*. Besides, I presume it to be impossible, to assign even a probable cause, why this spasm should return, and attack the surface of the body, at such regular periods, if there is not a combination of such causes as I have assigned, to produce it. But as I conceive that the doctrine of spasm, has been so strongly advocated, in order to explode the humoral pathology, and institute effects for original causes, or what is still worse, to suppose that fevers and many other diseases, may subsist for months, that do not depend on any offending matter in the fluids as their cause, I have been the more particular on this head.

ORGANIZATION BY FLUIDS.

BEING clearly convinced, that the solid parts of animals are at first produced and organized by the motion and plastic power of the fluids, and are afterwards repaired, actuated, and invigorated by them, as long as the fluids continue in a due quantity and good quality; but, when they are vitiated,

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either by contagious miasma, or by offending matter taken into, or generated in the system, the solid parts are injured, their functions disordered, and if the offending matter cannot be subdued or expelled, by the powers of nature assisted by art, the whole machine will be destroyed.

BUT solids of every kind, even the nerves, are entirely passive, insensible and inactive, when deprived of the fluids which give them life and energy.

WHEN treating of putrid diseases, I observed, that the sensation of cold in these, and in the first stage of an intermittent, depended upon different causes, which I promised to explain.

IN the commencement of putrid fevers, the nerves on the surface are extremely irritable, which is evident from the tenderness and soreness of which the patients complain. This I conceive to be caused by the morbid condition of the spirits, which being, in a great measure, decomposed by the putrid ferment; the fiery part, which, while blended and united with the lymph, constituted good spirits, and produced the most salubrious effects, does, in a separate state, act like the naked undiluted element, almost burning, or rather scalding, the parts it formerly cherished with a friendly pleasing degree of heat. These circumstances being considered, I presume it will appear very probable, that the sensation of *cold*, in the above case, is owing to the following causes, viz. The greatly increased irritability of the *nerves* by heat and acrimony; and the great difference

ence that has been produced, in a few hours, between the heat of the patient's body and that of the air. If a person continued in a bagnio some time, heated to one hundred and sixty degrees, he would be chilled and shiver in air heated to the ninety-sixth degree.

As there can be no reasonable doubt entertained, that the gastric ferment is greatly vitiated, and the contents of the stomach, in a putrid fever, having acquired that intestine motion denominated putrefactive fermentation, which is evident, not only from the pain, sickness, and anxiety felt at the pit of the stomach, but also by the disease being completely *conquered*, in some instances, by the immediate exhibition of an emetic; in agues the gastric ferment appears to be very weak and inactive, and the contents of the stomach always viscid and frequently gelatinous, there is an absolute necessity of evacuating its contents, and then giving the saline mixture to attenuate the remaining viscid juices and remove obstructions; when this is accomplished, I can recommend the following electuary; it has never failed (except in one instance) in above thirty years practice:—Take of the powder of the red Peruvian bark $1\frac{1}{2}$ ounce: powder of Virginia snake-root $\frac{1}{2}$ an ounce: powder of gentian root 2 drachms: golden sulphur of antimony $\frac{1}{2}$ a drachm: oil of cloves 50 to 55 drops: common honey a sufficient quantity to make an electuary. The patient is to take the bulk of a nutmeg every second or third hour during the intermission.—I have lately added the columbo root in powder to the electuary; and, after the fits are broken, the patient should take a bitter, made by infusing bark, gentian, serp. Virg. &c. in wine.

OF

*OF COLD,**AND**ITS EFFECTS ON ANIMALS.*

THE natural condition of all *matter*, in a perfect state of rest, is to be cold, except heat be communicated to it by fire in an active state; nor can any body be heated until the fire, which lies dormant in its composition, as a constituent principle, be excited into rapid motion by friction or collision; or by being plentifully supplied with fire in an active state. Thus, the earth is heated both by the rays of the sun and subterraneous fires. A nail is heated by hammering on its head, when it can be driven no farther into wood; the fire, which lay dormant in the iron, being brought into action by percussion. The fire, which lies dormant in a mass of unslacked limestone, is excited and brought into action by the application of water; although the stone and water were extremely cold prior to the application of the water. Gunpowder, aurum fulmenens, and even the electric fluid itself, will, in a state of rest, acquire as great a degree of cold as other substances which contain less fire; although a prodigious quantity of fire and fixed air lies dormant in gun-powder, it requires only a single spark, to bring into action the whole of the dormant element contained in many tons in one second of time, which may be termed a *generating activity*; a single spark generates such an astonishing degree

degree of motion and heat. Motion will, under certain circumstances, produce heat, by exciting dormant fire into action; but can never generate fire, nor produce heat, independent of fire. Fire itself can produce heat no longer than it continues in motion; therefore heat must diminish in exact proportion to the diminution of the action of fire, (heat being only a quality, or accident, of fire in action) in consequence of which every thing that we are used to call fluid, grows less and less so, in exact proportion to the diminishing activity of the *fire* which causes its *fluidity*, until, with the cessation of the action of the fire, it is converted into a solid.

THIS being an universal *rule*, the blood, and other fluids of the human body, are subject to the same law; the more they are agitated by motion, the more heat and fluidity they will acquire; and vice versa.

EVERY shoe-maker knows, that warm water will sooner enter a piece of leather, and make it soft and pliable, than cold water will do; and every ship-carpenter knows, that warm water will enter into the pores of an oak plank, and render it flexible, sooner than cold water. It is an invariable property of *heat*, to rarefy and expand; and of cold, to inspissate and condense: and their properties in this respect, is almost as apparent in some metals, as in softer bodies. If a broad thick band of iron be keyed round a millstone, while it is red hot, and then be suddenly cooled, by the application of cold water, it will snap off like a twine thread.

HAVING

HAVING considered the effects of *cold*, in fixing the most fugitive substances in nature, and condensing some of the hardest, let us now take a view of its effects on animals.

WHEN an invalid is exposed to the action of a cold air, the heat of his body will be diminished, in the parts most exposed to the action of the air, and the fluids inspissated in proportion to the diminution of the heat; the vessels benumbed, rigid and less elastic; the spirits will be rendered less active, by whose agency alone, circulation can be carried on through the most minute external vessels; the fluids will stagnate, producing numbness, torpor, and insensibility; which will appear, if an incision be made in a part thus frozen, no blood will issue from the wound. If a vigorous person be exposed to an extreme cold air, its first effect will be stimulant; which, by exciting a painful sensation in the parts more immediately exposed, will cause such an increased flow of spirits to the part affected, and consequent rapid circulation through the small cutaneous vessels, as to produce a redness and glowing heat in the parts, sufficient to counteract the effects of the cold for some time; but this cannot continue long, for the blood must lose some part of its heat, in each round of circulation, and in consequence be less and less fluid: so will the spirits be exhausted and rendered less active, by the effects of the cold, and the exertions generally made, on such occasions, to assist circulation by muscular motion; the external vessels, more contracted and benumbed; the limbs

limbs grow stiff, feeble and insensible; the warm blood, from the centre, can no longer circulate to the extremities, but will be driven to that part of the system, where it meets with the least resistance; which, for obvious reasons will be the brain, which being inclosed in a case of bone, is defended both from the cold, and pressure of the air; thus will the brain be overcharged with blood, and a lethargic sleep produced, out of which the unhappy patient cannot be awakened; but sinks sleeping and insensible into the cold arms of death.

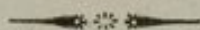
WHEN persons have been found by others, soon after they have expired, from the effects of intense cold, it has been customary to bring them immediately to the fire, which is obviously improper; because we find by experience, even where some external member is touched with the frost, if the patient be brought to the fire, and the part affected be thawed, a mortification ensues and destroys the parts that were frozen. If it be possible to restore the patient to life, the most rational procedure must be, to immerse him in spring water, which will be many degrees warmer than the body of the patient; and which we know is possessed of the admirable power, of extracting the frost from frozen substances, without injuring their texture. When the frost is extracted, the body should be well rubbed, until the flesh grows soft, and the limbs recover a degree of flexibility; the patient may then be put into water about blood warm, with the addition of half a gallon of good spirits; and after rubbing him some time in it, dry him well off, and put him into a bed well warmed,

warmed, inflate his lungs with good air frequently ; introduce volatile spirits into his nostrils with a feather, and treat him in all other respects like a drowned person.

HAVING mentioned the treatment of persons drowned, I embrace this opportunity to express my disapprobation of the practice of rolling the patient on a barrel, in order to evacuate the water, which it is presumed he had *swallowed* while drowning ; although nothing can be more evident, than that respiration and deglutition cease nearly at the same time. But supposing the patient to have drank a quart of water, which is very improbable, as he must swallow 32, if not 64 times to drink a quart, the mischief which even a greater quantity of water taken into the stomach, could rationally be supposed to produce, can never warrant the preposterous practice, of rolling the patient on a barrel to evacuate it. As I think it must be evident to any person, that when a man is laid on a barrel, and rolled with his head down, that all the blood in the abdominal veins will be impelled by pressure to the heart, and from thence to the brain, and vessels of the head ; which would undoubtedly produce an apoplexy in the most healthy subject, and must certainly prevent recovery, in cases where animation is suspended. I am positive that if the experiment could be made upon a criminal, under sentence of death, it would kill him as certainly, and almost as soon, as in the common mode of suspension ; although he could in a great measure abate the pressure upon the contents of the abdomen, by bracing the abdominal muscles.

Another

Another bad practice, though not of such fatal tendency, is rubbing the body of the patient all over with fine salt, while it is wet, which has a tendency to produce an extreme degree of cold, which should by all means be avoided; for if some considerable degree of heat cannot be promoted, a recovery cannot be effected.



OF THE GENERATION OF HEAT

IN

RESPIRING ANIMALS.



HEAT may be generated by smart friction, collision, agitation, fermentation, effervescence, &c. but never without producing brisk motion and the decomposition of some compound matter.

THE heat that is generated in the bodies of respiring animals, is excited by friction and agitation, whereby the electric portion of the air, received by the lungs in respiration, is gradually decomposed in the course of circulation, evolving heat in its progress.

THIS I take to be demonstrably evident, because it is now well known, that pure dry atmospheric air is an electric *per se*; and, that the air which we expel, has been robbed of this elastic spring of motion, in its passage through the lungs, as it will neither support animal life, nor flame.

THIS universal agent, that is every where present, pervading all things, most probably consists of a combination of pure elementary *fire* with *oxygen*. I am positive that it is a compound, and that heat is evolved by the action which precedes and accompanies its decomposition ; but whether I am right or not, with respect to the oxygen being one of the ingredients, I wish the chymists to determine.

THE degree of heat which is most conducive to health and vigor, is that which is generated by the regular progressive motion of the fluids, whereby the electric matter received from the air, by the lungs, is progressively brought into action, in the course of circulation, diffusing heat equally through the system, which is gradually passed off by perspiration, that the lungs may receive a fresh supply at the next inspiration. If this electric spirit is received and retained for any considerable length of time, without being excited into action and expelled, it will accumulate to a degree sufficiently active and powerful, (when excited) to consume the body as completely as if done by culinary fire ; which accident really happened to Lady Banda, Grace Pelt, and several others, besides a woman in the city of New-York, nicknamed, Man of War Nance.

WHEN the spirits generated by alimentary fermentation are deficient in quantity, or of a vapid inert quality, the circulation will be languid ; the natural heat of the body will be reduced by the action of cold damp air ; the finer fluids will be inspissated in a degree proportioned to the diminution of heat
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and action; a partial or general torpor will ensue; the fluid inspired from the air will not be sufficiently excited into action, and regularly expelled, but will accumulate in those parts of the system which are reduced to the greatest degree of cold and torpor, through a defect of heat and motion, until it is excited and brought into action by exercise, or some adventitious stimulant, when it will produce a fever with much irregular partial heat, and a frequent but feeble pulse; which paroxysm will continue, until the viscosity of the fluids is in some considerable degree attenuated by heat and motion, when a profuse sweat, or free perspiration, cools the body by evaporation, carrying off the redundant quantity of fire that is now extricated, and a remission or intermission ensues.

WITH respect to the accumulation and condensation of the *spirits* and *fluids* by *cold*, and their sudden and violent action when excited by *heat*, there are but few persons in this climate, who have not experienced the effects of these changes in some degree.

WHEN a person goes out in very cold weather, with his hands bare, the first sensation he feels, is a smarting pain from the stimulus of the cold air; and the first change which he perceives, is caused by the spirits and blood rushing into the stimulated vessels of his hands, rendering them red and turgid; at length they grow stiff and are so benumbed, that sensation is quite destroyed. If, in this condition, the person goes to the fire to warm his hands, the spirits that had been accumulated and rendered inactive by
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the cold, will be suddenly excited into extremely violent action, generating a degree of heat sufficient to destroy the texture of the parts and produce mortification.

It has generally (although very erroneously) been supposed, that the texture of the solids is destroyed by the action of the frost. But if the frozen members are immediately immersed in good spring water, before they are otherwise thawed, the fire will be gradually brought into action, the ice thawed and expelled to the surface, where it will form an incrustation; and after it is all extracted by this means, the parts that were frozen even to the bones, will be perfectly restored to ease and vigor.

In this case, two things are clearly apparent.

1st. THAT the texture of the solids is destroyed by the action of the *fire* retained in the parts, and not by the *frost*.

2dly. THAT this redundant quantity of fire, had been accumulated, and reduced to a latent state, by the stimulant and frigorific action of the cold air; for if there had been only the natural quantity of fire in the parts, it could never heat and inflame the solids to such a degree, as to produce mortification.

WHOEVER is of a contrary opinion, must believe spring water to be a most miraculous remedy, to be possessed of sufficient virtues, to restore the ruined texture of the solids to their pristine ease and vigor, in the space of one or two hours.

BESIDES

BESIDES the natural salubrious kind or degree of heat, which is produced by the regular progressive motion of the fluids, there is another of a very deleterious kind, generated by what I have denominated putrefactive fermentation ; which is an agitation of the fluids, by a chymical process, in which the fixed air is extricated and expelled. By this chymical agitation in putrid fevers, I have known the heat raised to a considerable degree, and continued some time after death. This process seems to be in some respects analogous to that which is generated in a quantity of hay, that has been put together before it is perfectly cured ; as the same effect is produced in both cases, viz. the extrication of fixed air, and the dissolution of the substance acted upon.

I HAVE supposed, that this agitation is produced by the fire uniting with the fixed air, which had been a fixed component part of the solids, by which it is turned elastic, destroying the cohesion of the parts from which it is extricated ; and frequently dissolving the blood almost to the consistence of water, which will ooze through the relaxed pores of the vessels, staining the cuticle with black spots, and issuing from almost every part of the body.

THIS dreadful fermentation generally begins, or at least discovers its direful effects more evidently, after the progressive motion of the fluids is considerably reduced. It is seldom attended in its progress with severe pain, but with extreme debility ; and is generally first discoverable, by the tongue being covered in the middle and near its root with a dark brown sordes,

sordes, that cannot easily be washed, or even scraped off; and when the patient is requested to put out his tongue for inspection, it trembles greatly; but when black spots appear upon the skin, the matter is decided.

THIS view of the subject pointed out to me, above twenty years ago, the propriety of endeavoring to check and defeat the operation of this deleterious ferment, by the operation of another, of a nature entirely opposite to it, which I readily found in the best fresh *yeast* from strong beer wort, in the act of fermentation, of which I have, since that time, given many gallons, in all kinds of putrid diseases, with such success, that I believe it in its various preparations, to be an infallible remedy, if prescribed at the first attack, and the various preparations suited to the different stages of the disease.

DIRECTIONS for this purpose, with several histories of cases, are contained in a small treatise which I have written, and which yet remains in manuscript.

DYSENTERY.

THE better to elucidate my theory, I shall attempt to give the etiology of the dysentery, which generally prevails in the autumn, after very hot summers, when the middle of the days are very warm, and the mornings and evenings cold and damp. The heat in summer renders the juices acrid and rancid, by
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melting down the fat in the adipose cells; but, as long as sweat and perspiration are promoted by an equable degree of heat, the pecant juices are eliminated by the pores of the skin; but when they are checked by the cold of the morning, the operations of the *vis medicatrix* determines them to the bowels; however, as small progress can be made in this process until the heat of the day comes on, and determines them again to the skin, the cold of the evening again repels them; the warmth of the bed invites them again to the surface; the cold of the succeeding morning repels them again; so that they cannot escape either way, but go on increasing in quantity, and acquiring a greater degree of acrimony, by retention, and the heat of the weather in the day-time, until, at length, the person thus predisposed is exposed for some time to a cold and damp air, which inspissates the finer fluids, checks perspiration, produces an external chill, and fairly determines the pecant matter to the stomach and more irritable intestines, which are so vellicated by the acrimony of the humors, that spastic strictures are produced, which prevent their free discharge by this emunctory; and the intestines being stimulated and pained, a preternatural quantity of spirits and grosser fluids will be determined to them, distending their delicate slender vessels, so as to rupture and cause them to pour out their contents. The natural mucous which covers their nerves being abraded, renders them more and more irritable; the constrictions increase; their peristaltic motions are impeded; the fœces are retained, indurated, dried and formed by pressure into small round lumps, which contribute greatly to aggravate
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the symptoms. The physician should, therefore, make it a particular point to expel these from the bowels; for, as long as they remain, it will be impossible to remove the pains which torment the bowels: the chief flow of the spirits will be to them; the skin will be dry and rough; but, as the patient can never recover perfectly until the pores of the skin are rendered pervious, every rational means should be used to restore the cuticular discharges; such as the warm bath, sudorific anodine draughts, with general frictions, and wearing flannel next the skin.

THE above is a description of the disease, as it is generated in the body of the patient; but it is also frequently contagious, especially when it is attended with a *putrid fever*, which may be distinguished, *with certainty*, by the following symptoms:—On the first days, great heat, with a feeble pulse; the patient, at the same time, complaining of a sensation of cold, while persons in health are too warm; soreness and tenderness of the body in general: but the most unequivocal signs of putrefaction are to be discovered by inspecting the tongue, which, if the disease be violent near its basis and along its middle appears as if lightly covered with molasses, while its tip and edges are preternaturally bare; and when the patient protrudes it for inspection, it trembles in an uncommon manner, which he cannot prevent. In the progress of the disease, the tongue, fauces, lips, and even teeth, are covered with a very brown or black sordes, often very tough and viscid, which can be washed off with good *yeast* easier than with any fluid yet known. When the slimy covering is washed off,
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there appears a great number of filaments, which seem to have been protruded through the pores of the tongue, and cannot be washed off, until the fever is conquered : when it separates and comes off, it is the most certain sign of recovery.

IF the above recited symptoms are attended to, any person may determine whether the fever is of the putrefactive kind, or not ; which is essentially necessary in practice, to discriminate a putrid from a nervous fever, as they have many symptoms common to them both, such as great weakness, transient chills succeeded by flushes of heat, &c. and yet require a very different method of treatment ; therefore, blisters are almost always necessary in nervous fever, and as certainly do mischief in the putrid ; gentle stimulants and attenuants are useful in the nervous, except such stimulants as have a greater tendency to produce intestine motion, than progressive ; and all attenuants are poisons in putrid fevers.

THIS is the idea of the pathology of the disease, which I formed very early in life, being always of opinion, that nothing could be more absurd, than to attempt to cure any disease, without endeavoring at least to investigate its cause, and discover, by close attention and accurate observation, what was altered from a state of health, by the operation of the disease, and the causes which produced such change. The great neglect of this important branch of the medical art or science, which has been but too general, is the cause why it is, at this enlightened period, esteemed a vague conjectural science, having no

solid foundation whereon to rest, nor any certain principles to direct us in the investigation of hidden causes, and their effects: one vague hypothesis having been formed after another, which have had their day; but as they were the productions of the warm fertile imaginations of their several inventors, and not the result of a careful and critical investigation of the laws of nature in general, and those of the animal economy in particular: (which should be carefully attended to by every physician, who wishes to excel in his profession, and trace effects from their causes; and in many cases to counteract the effects which would be produced, if not obviated in time.) It frequently happens that some part of such hypothesis is discovered to be erroneous; in consequence of which, its fate in general is, to be damned in bulk, together with all the doctrines taught by the author; and if the person who detected the error, happens to be possessed of a fruitful invention, and fertile imagination; he falls immediately to work to form another, as ideal as the former, and as opposite to it as east is to west; for it appears to be the foible of the human mind, to fly from one extreme to the other, as people who have broken the fetters of *Despotism*, are very apt to progress to the extremes of *Anarchy*. When it was discovered that obstruction was not always the proximate cause of inflammation, many were for discarding the humoral pathology altogether; and for resolving every deviation from health into nervous affection, as if the nerves were liable to be injured without any cause to produce the effect; therefore the cold fit of an intermittent, is caused by that kind of nervous affection

tion denominated spasm, and all the other symptoms and stages of the fever depend upon this *spasm* as their cause; but what occult cause should produce this spasm; or, why it should intermit and return at certain regular periods? is a question too difficult to answer, without the aid of Van Helmont's Archeus. I readily grant that the nerves are affected in every considerable disease, as they are the instruments by which every sensation is communicated; but cannot believe them to be so captious as to complain without a cause. But, when they do complain, it is of the greatest importance that the physicians should understand their language, which is uttered in the symptoms of disease; for, if they are not understood, the work will be carried on like the Tower of Babel, after the language of the workmen was confounded. When the *Vis Medicatrix* calls for a cordial, she will be furnished with a solution of nitre, or crude sal ammoniac in vinegar: and when a refrigerent is indicated, a comfortable potion of the oil of cloves, or cinnamon, may be exhibited. But as I have always conceived that every effect must depend upon some adequate cause, when I found a patient complaining of a violent pain in his bowels, with a frequent stimulus to go to stool, I concluded that these pains and efforts of nature, were caused by some offending matter, which could not be expelled by the unassisted efforts of nature; that wherever there is great pain, there must be a redundancy of spirits present in the part affected, while they were deficient in other parts; that this would produce spasm, which would contract the intestines, and prevent the expulsion of the offending matter; that

that a sufficient dose of laudanum would remove the spastic constrictions of the intestines ; and that four or six grains of calomel with an infusion of two ounces of manna, and two drachms of senna, in three gills of boiling water, giving one third part every half hour, would purge the patient, and carry off the offending matter, before the pain and spasms returned : the next intention, after clearing the first passages well, was to prevent the return of the pain and spasm, by obtunding the acrimony of the pecant humors, by supplying the bowels with some soft mucilaginous liquor, to supply the place of their abraded mucous and defend their nerves—which may be done effectually, by a decoction of red elm bark in water, rendered as palatable as possible, by the addition of a small quantity of Madeira wine, cinnamon, and loaf sugar ; which may be taken very often, but in doses that will not load the stomach too much. When I was a lad, I cured some hundreds one fall, by purging them once or twice ; after which they took the following decoction.—Take of the roots of comfry and upland Solomon seal, of each two ounces ; tormintil root, three drachms ; white-oak bark, one ounce ; reduce these to a coarse powder, and boil them very gently in three pints of water, to a quart, and towards the last of the coction, add one drachm of good cinnamon and a large nutmeg bruised, and when cool, a gill of good old Madeira wine, with as much double refined sugar as to render it agreeable to the patient's palate.

CANCERS.

CANCERS.

My intention at first, was, that this work should be purely theoretical; but, as I wish it to convey as much useful information as can be comprised in so small a volume, and as the cancer has hitherto been the most unconquerable disease to which the human species is subject, the communication of a safe efficacious remedy for such a direful malady, must be acceptable to the public. Had it not been for the prevalence of avarice and base self-interest, the world might long since have been in possession of a successful method of treating cancers. Some years ago, a person of the name of Plunket, discovered a remedy, of which arsenic was the principal ingredient, by which cancerous tumors could be extirpated; but the application is attended with severe pain. This remedy was kept a secret in a few hands, or the recipe sold at an enormous price to a few persons, who were laid under injunctions not to divulge it. Doctor Martin of Philadelphia, was possessed of a knowledge of treating cancers, in general with success, when local or confined to a particular gland; but whether he was possessed of a knowledge of any method of correcting the cancerous virus, when diffused throughout the system, I have never been informed; but be this as it may, I believe that his knowledge died with him.

THE method of extirpating cancers with the knife, is often so alarming to the patient, that the operation
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is too frequently deferred, until the cancer ulcerates ; and then, if an extirpation is attempted, the greatest care must be taken by the operator, to prevent the ulcerated part from coming in contact with any part of the incision, which will inevitably contaminate the whole mass of fluids. Of this I have seen two melancholy instances.—A woman about twenty-four years old, who had a large scirrhus tumor on the right side of her neck, applied to me, and I advised her to have it extirpated : she sent for an eminent surgeon, who urged her to have it done without delay ; but she fearing the operation, put it off, until it ulcerated, and then consented to have it removed : but when the surgeon had made an incision quite round the tumor, and had dissected to its base in the under side, he then drew it gently down as he separated the diseased from the sound parts ; by which means, the ulcerated part of the tumor was brought into contact with the sound parts, in the under side of the wound ; and in a few days it was evident, that the cancerous virus was communicated, by this means, to the whole system, and she soon died in great torment ; and her mother was infected by the same virus, which she probably caught by washing the linen which had been used in dressing her daughter. I think it most likely, that the mother has had some small wound, or abrasion of the cuticle of her hands. She had several cancerous tumors, which soon broke out on various parts of her body, some of which were extirpated by a caustic application, used by Dr. Van Kemena. She then applied to me, and I told her, that she need not expect any permanent relief from the extirpation of the tumors, as the
cancerous

cancerous virus had pervaded the whole system ; but I advised her to take an infusion of the root of the sharp-pointed dock (*lapathum acutæ*) in water, which soon checked the progress of the infection.

I AM convinced, from the result of a number of experiments, that an infusion of the dock-root in water, taken constantly for six weeks or two months, will conquer the cancerous virus in any person that is, in other respects, free from disease.

IN warm weather, the infusion is made by infusing an ounce of the pounded root of the sharp-pointed dock in a pint of cold soft spring water ; and, after it has stood four hours, the patient may take a wine-glass full every third or fourth hour.

THIS may be taken while the gland is in a scirrhus state, and is essentially necessary during the cure of an ulcerated cancer. When any gland becomes swelled and painful, a strong solution of crude sal ammoniac in rain water, applied with old soft linen to the part affected, wetting the linen as often as it dries, will seldom fail to remove the obstruction, and restore the gland to its pristine state.

BUT if the obstruction cannot be removed, and the gland continues to increase in size, attended with darting pains, and it becomes absolutely necessary to have it extirpated ; if it be small, and seated near the surface ; take equal parts of white arsenic and sulphur, levigate them well together in a glass mortar, and then sublime the compound in a long necked retort,

retort, in a sand heat; the sublimate will adhere to the neck of the glass, (this sublimate may be made more or less active, by augmenting or diminishing the quantity of the sulphur, which restrains or bridle the action of the arsenic) then express the juice of the ripe berries of the *phyta laca*, commonly called poke weed, and by some people, gargit root; the juice is crimson red: expose it in a broad porcelain vessel to the sun and air in clear days, and bring it in every night, until it acquires the consistence of a soft extract; incorporate one grain of the sublimate with ten grains of this extract, and apply it to the most prominent part of the tumor, and renew the application once every twenty-four hours, if the first does not appear to act with sufficient energy: and if the indurated gland be small, it will be eradicated in three or four days. It must then be dressed in the following manner, viz. Take the fresh root of the sharp pointed dock, pound it to a pulp in a clean marble mortar, add a small quantity of rain water, and then express the juice, and keep it in a vial close stopped. The wound should be filled up even with soft flakes of lint dipped in the juice, and then covered with any adhesive plaster that will confine it, and exclude the air. Old foetid and cancerous ulcers may be dressed thrice every day until good pus is formed, which generally happens in four or five days, after which, dressing twice every day will answer.

AND I am convinced, by what I have experienced in the course of thirty-three years practice, that there are few, if any, ulcerated cancers that cannot be effectually

fectually cured by using the infusion of the dock-root internally, and applying the juice externally, if the patient will but persevere in using them, without flying from the use of one remedy to another, provided the bones are not affected, and the constitution of the patient is, in other respects, sound, and free from scrofulous or other taint.

THE base of ulcerated cancers, are frequently very much indurated, and consequently their suppuration and digestion are very slow. In such cases, the parts which appear to be most hard and prominent, may be dressed with a very soft extract of the juice of the ripe berries of the *phyta laca*, (commonly called poke-weed, scoke, or gargit root) and covered with lint wet with the expressed juice of the dock-root; or in winter when the extract cannot be procured, a decoction of the root of the poke in water, may be used for the same purpose, and may be applied more or less freely, according to its operation.

CYNANCHE MALIGNA,

OR

ULCEROUS SORE THROAT.

IF the disease is at first attended with great heat and thirst, add two table spoonfuls of the best yeast, to a pint of a strong infusion of good ground barley malt, (in boiling water) after the infusion gets to be about milk warm, of which the patient may take

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a wine

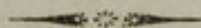
a wine glass full every hour, while it is fermenting; and at the same time use the following gargle. Take the root of the yellow or sharp-pointed dock, half an ounce; Virginia and Senca snake-roots, of each one drachm and an half; Peruvian bark six drachms; myrrh and sal ammoniac, of each two drachms; sal nitre, one drachm; honey, three ounces; infuse the roots and bark in one pint and an half of boiling water, rub the myrrh in a mortar with two ounces of camphorated spirit of wine, until it is pretty well dissolved, and when the infusion is milk warm, add the ingredients, together with two table spoonfuls of good yeast; and while it is fermenting, the patient should gargle it in his throat frequently, and if the tonsils are ulcerated, they should be frequently washed with a small swab, made by rolling old soft linen about a small stick. And when the throat is very sore, pour boiling water on the inside bark of the red elm, until it grows slimy, and hold some of it frequently in the mouth, and gargle it, which will yield great relief.

WHEN the violence of the fever has abated, if there are yet evident signs of putrefaction remaining, take Peruvian bark six drachms; Virginia snake-root and contrayerva, of each two drachms; bruise them in a mortar, and infuse them in a pint and an half of boiling water, and when it is milk warm, strain it off, and add two ounces of sugar and two table spoonfuls of yeast; and while it is in brisk fermentation, let the patient take a wine glass full every second or third hour.

BUT

BUT in the country, where these ingredients cannot be obtained, I am certain, that a gargle made by infusing an ounce of the inside bark of the wild cherry-tree, and half an ounce of fresh sharp-pointed dock-root, bruised, in a pint of boiling water, and sweetened with honey; and an infusion of the cherry bark and wild alspice, used in the same manner as above directed, would answer a very valuable purpose; using the mucilage of the red elm bark, as above directed, to prevent irritation.

GOOD Port wine and water, sweetened with loaf sugar, may be taken to advantage, as a cordial, if the heat of the body is moderate.



CYNANCHE TRACHEALIS

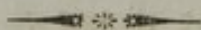
Is an inflammation of the epiglottis and inside of the windpipe, causing a very difficult respiration; and, if neglected or maltreated, proves fatal in a short time.

IF the patient is seized with a violent chill, and it can be conveniently done, he should immediately be put into a warm bath, heated to the 98th degree of Fahrenheit's scale: but if the chill is slight, he may sit with his feet and legs in a warm bath of pure soft water, of about two gallons, put in a narrow vessel, in which two ounces of nitre has been dissolved. This may be continued about twenty-five minutes at one time, and repeated occasionally by heating the same water. Thus the nitre will be absorbed and equally diffused through the system.

INFUSE

INFUSE a large handful of mullen flowers in a pint of pure soft boiling water, close covered over, until it is so cool that the patient can bear to receive the steam into his lungs, through the pipe of an inhaler, or, if that cannot be had, the pipe of an inverted funnel will answer; add now one drachm of good sweet spirit of nitre, and let the patient take in the steam with his breath until it cools, then sweeten it with loaf sugar, and let him hold about half a table spoonful in his mouth frequently, and swallow it very gradually, so that it may have time to soak into, or be absorbed by, the inflamed vessels. If there should be occasion to heat the infusion a second time, more spirit of nitre must be added; but I do not remember that I ever found it necessary to repeat it. Externally: dissolve ten grains of camphor in one ounce of spiritus nitri dulcis, and apply to the throat, with soft linen, wetting it as often as it dries.

IF the mullen flowers cannot be had, take the leaves; but the infusion must be strained through close fine linen. If the leaves cannot be obtained, make the infusion with red elm bark, and use it as directed above, with the addition of the spirit of nitre.



SMALL-POX BY INNOCULATION.



IF the subject who applies is, in all respects, healthy and clear of scrofulous and all other impure taints, make an incision with a clean lancet, introduced flat-wise under the cuticle of the left arm, about half
way

way between the shoulder and elbow ; then take another lancet, whose point has been infected by the well digested matter from a ripe pustule, and introduce it into the incision, gently moving it, to leave a quantity of the matter in the incision ; then withdraw the lancet, and if any blood issues, let it dry on, and leave it without any kind of dressing.

ALTERATIVE POWDER.

TAKE calomel and cinnabar of antimony, well prepared, of each one ounce ; golden sulphur of antimony, half an ounce ; tartar emetic, twenty grains. This powder should be perfectly mixed, and kept from the air in a vial with a glass stopper.

PURGING POWDER.

TAKE the powder of jallap, two drachms ; purified nitre, twenty-four grains ; mix it well, and divide it into four doses.

ON the first night after infection, the patient begins, and takes five grains of the powder every night at bed-time, in syrup of sugar, until he has taken three, and takes one of the four purges in the morning. He begins the second night after the purge, and takes three more powders as before, and next morning another purge. This ends the preparations of an adult.

THE patient lives on a light fresh diet, avoiding things that are very salt, sour, fat or oily, and every thing that is heating. Clear cool air does great service, provided the patient does not sit where it has a
current.

current. Damp foggy air is noxious, and should be avoided.

WHEN the pocks have turned, the third purge is taken in the morning, and the fourth in six or eight days.

THE doses must be diminished for weakly women and children, in proportion to their age and strength. I have generally purged tender subjects with manna, &c.

ACIDS taken after the powder, or abounding in the stomach, will cause the powder to puke the patient.

THE celebrated Doctor Rush, in the course of his lectures, has undertaken to explain to his pupils, the cause, Why excess in the force, or frequency of the action of the blood-vessels should succeed debility in a part, or in the whole body, and be connected for days and weeks with preternatural debility in the muscles, nerves, brain, and alimentary canal?

WHETHER the Doctor has explained this question to his own satisfaction, or to that of his pupils, or not, is not my present business to inquire: but as the question is both curious and important, I will attempt to explain it agreeably to my own theory. But in order to give it a fair investigation, and explicit answer, it behoves to inquire, What are the springs of motion, life, and sensation, in the body of man? How are they generated? And by what means are their energies propagated through the system?

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We must also consider the human body as an animated automaton, that must repair the injuries which it may suffer from the ravages of disease, by the exercise or operations of the powers inherent in the system, which has generally been denominated the *Vis Medicatrix Naturæ*. I have endeavored to prove, that the energy or active powers of the system depends upon a constant regular supply, and equable diffusion of spirits derived from two different sources: the ingredients of the first kind, are collected, and in some degree compounded, in the stomach, by alimentary fermentation, mixed with the chyle, conveyed by the thoracic duct into the left subclavian vein, where it is blended with the whole mass of fluids, and completed in circulation through the glandular fabric of the brain, and transmitted to every part of the system by one set of nerves, as conductors, and in part returned to the brain by another set, which may be termed recurrent, or sensorial nerves, as they transmit to the sensorium a knowledge of the impressions made either by internal or external agents, upon the organs of sense: upon the due quantity, perfect quality, regular motion, and equable distribution of the compound spirit which they convey, the nourishment, sensation, irritability, health and vigor of the body depends; and debility and disease, the certain consequence of any considerable deviation in the above circumstances, relative to this fluid.

BESIDES this important source, or active spring of motion, life and sensation, we derive another of no less importance from the air in respiration. And
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God breathed into his nostrils, the breath, or *spirit*, of life, and he became a living soul. It is now well known, that pure dry air, is an electric *per se*, and that the air which we expire, has been robbed in the lungs of that elastic active spirit, which is absolutely necessary to support both animal life and flame. This spirit is the true vital stimulant, the sine qua non of animal life, by which the lungs and heart are stimulated, and excited to perform their incessant operations from infancy to old age: nor does its action terminate here; for, being mixed with the blood in the lungs, it pervades every part of the system, promoting by its immediate energy the circulation of the fluids, not only through the vessels immediately connected to the heart; but also through the lacteals, lymphatics, cellular system, and even through the vessels of the fœtus in utero, where the power or force of the heart cannot possibly reach, producing heat, motion, fluidity, life and sensation in its progress. If the heat and action of the system be considerable, a great part of this electric spirit is decomposed and dissipated; but if the heat and action be languid, it will be longer retained in circulation, and in consequence, a part of it will be converted into permanent spirits by the action of the brain, in each round of circulation, which will increase heat and circulation, sufficient to excite and bring the portion which had been retained into action, and produce a temporary fever. In this electric spirit, we discover the grand spring of motion and circulation, whose stimulant powers are immediately exerted upon the heart and blood-vessels, without which, circulation and every vital function would cease in a few minutes:

minutes : it is therefore evident, that the action of the blood-vessels depends more immediately upon the energy of this spirit, than upon either the strength or weakness of the body. If, therefore, we allow the stimulant power of this spirit to be the same both in sickness and health ; yet, in all febrile diseases, there is still a preternatural stimulus super-added to that which is natural, which will increase circulation in some degree proportioned to the increased degree of irritability, notwithstanding the partial or general debility of the system. To maintain perfect health and vigor, it is requisite that every function of the system should be duly and regularly performed ; but, if the spirits generated by alimentary fermentation are either deficient in quantity or of a bad quality, or irregularly distributed, it is impossible that all the functions should be regularly performed. If, for instance, the gastric ferment should be greatly vitiated, crude, vapid, inert, chyle would be generated almost devoid of spirits ; a general debility would soon ensue ; in consequence of which, several functions would be injured ; the secretions and excretions would not be duly and regularly performed ; crude viscid matters would be retained, which should have been expelled, until they acquire a degree of putrescent or other acrimony, which would act as an additional stimulant to the blood-vessels, exciting the heart and arteries to more frequent, and sometimes even forcible contractions. By these means the powers inherent in the system, are stimulated and excited into increased action, to heat, agitate, attenuate and expel offending matters. The judicious use of medicine, will assist the debilitated pow-

ers of nature to perform this office : in this case, the physician only furnishes the instruments, but the vis medicatrix is the operator ; for if the powers of nature are so far extinguished that they cannot be stimulated or roused into action, medicine can produce no salutary effect.

WHEN the physician gives a purge to evacuate the bowels, an emetic to clear a foul stomach, or opens a vein to diminish a redundant quantity of blood, he is only imitating nature, and lending her aid to do that which the unassisted powers inherent in the system had invariably done, while they had power to operate. If it be true, that it is necessary for the maintenance of health, that the active powers and functions of the body should be constantly and regularly employed, in preparing and applying those parts of the ingested aliments that are destined to nourish the body, and in separating and expelling the feculent parts, I think it must be evident that these operations cannot be completely performed during either partial or general debility of the system. The nutritive part of the aliment will neither be duly prepared nor properly applied ; and that those feculent noxious matters, together with the *latent fire* which had been retained in the body during the debilitated state of the system, will continue to stimulate the heart and arteries to very frequent and often irregular contractions, until they are heated, agitated, attenuated and expelled.

AND if it be also true, that the health and vigor of the body depend upon the due quantity, perfect quality,

quality, regular motion, and equable distribution of the spirits, it follows of course, that the muscles, nerves, brain, and alimentary canal, must remain in a preternatural state of debility, until they are furnished with a sufficient supply of *spirits* and nourishment, by alimentary fermentation or digestion; which will require several days, if not weeks, for the debilitated powers of the system to repair the injuries sustained by the preceding disease, and furnish the necessary supplies, q. e. d.

By what I have said, I by no means wish to persuade the young practitioner to stand by as an idle spectator, waiting for the debilitated and deranged powers of the vis medicatrix to regulate its own operations, which are sometimes too remiss and feeble, and at other times too violent and irregular—but as soon as he clearly perceives what ought to be done to assist or regulate the operations of these inherent powers, he should immediately lend his aid, by prescribing such remedies, or using such applications, as experience has taught to be most beneficial in similar cases. I only wish at present to establish the fact, that there are such powers inherent in the system, that are in almost continual operation for the conservation of the body, by obviating disease, otherwise no person would enjoy even tolerable health ninety-six hours. Yet, I do not believe that these operations are directed by a conscious intelligent principle residing in the body, with a design to combat disease, or expel pecant matter; more than I believe, that a perfect child, formed in the womb of a stupid ignorant African woman, is fashioned by the intelligence of
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of either the father or the mother : or, that the elements of which our atmosphere is composed, are possessed of intelligence : and yet we see, when the air is heated and rarefied, the cold dense air flows in, and cools it. Although a child, an idiot, or an horse, are incapable of assigning any physical reason, why they should drink ; yet they are as powerfully impelled to repair to a fountain to quench their thirst, as the most sagacious physician. Patients in ardent fevers, long for cold water, and hundreds have been sacrificed by withholding it from them. Nine patients out of ten, in putrid fevers, crave acids ; and patients in nervous fevers crave wine and cordials, which ignorant physicians have refused to give them, and especially when they were delirious, conceiving, as they phrased it, that the fever had attacked the patient's head, and that it required cooling medicines and applications to subdue it. Had these physicians known, that the delirium in this case was caused by the inactivity of the spirits, they would have also known, that these cravings were the indications or language of nature, by which she informed the intelligent physician of her wants. This language is tolerably copious when it is well understood, both negatively and positively : for instance, we never hear of a patient in ardent fevers, craving or longing for spirits or spices ; in putrid fevers, for flesh, fish or eggs ; or in nervous fever, for vinegar or melons, and but seldom for cool water, except it be to moisten the mouth, when too dry. But why should I presume to talk of the indicative language of nature, or the *vis medicatrix*, since Doctor C. C. has ridiculed the idea of the existence of such an
imaginary

imaginary principle, which he alledges is sufficient alone to cast a shade of disrespect on the whole elaborate doctrine of Doctor Cullen : and affirms, “ that
“ a belief in the action and influence of such a prin-
“ ciple in the living system of man, can, at the pre-
“ sent day of science, be considered in no other light
“ than as a relict of ancient superstition in medicine ;
“ and is clear for wresting the business of *cure*, whol-
“ ly out of the hands of nature, and treating his
“ patients agreeably to the principles or rules of art.”
But would it not be advisable to postpone this assumption, at least, until the proximate cause of fever is well defined and clearly understood ? And now I beg, and beseech, and pray, that previous to my being subjected to the lash of *ridicule* for espousing this exploded doctrine, that Doctor C. will be so good as to give candid answers to the following questions, viz.

WHETHER, in his opinion, it was the efficacy of Doctor Cheselden’s applications, or the operations of the *vis medicatrix*, that re-produced the miller’s thigh-bone ? Or, when the head of the *os femoris* happens to be broken off, and the bone forced above the *acetabulum*, by the contractile power of the muscles, whether it is most owing to the great skill and attention of the surgeon, or to the blind unintelligent operations of the *vis medicatrix*, that a new socket is formed to receive the head of the bone, and synovial glands produced, to lubricate the new articulation ?

IF there are not powers inherent in the system that have a tendency to combat and to vanquish disease ;
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by what means does any sick person recover without medical assistance? But, as we see that numbers do recover without medical aid, I think it must be granted, that there are such powers as I contend for; unless it can be proved, that a continuance of the *cause* which produced the disease, is also the cause of the cure; which, in many cases, would be as absurd as to alledge, that although flogging a man with a cat-o'-nine-tails might make his back very sore, for a while, at first, yet a continuation of the flagelation would heal it again.

IN chirurgical cases, the operations of the *vis medicatrix* are more visible than in her more concealed internal economy. In these cases, we frequently see the matter in large abscesses converted into good pus; expelled by degrees; new vessels and muscular flesh generated; and the part often restored nearly to its pristine state: we see fractured bones reunited, and fitted again to perform their office; large flesh wounds are healed, &c. but the most complicated operation of this kind that I have seen, was a case in which a large piece of the cranium was removed; in a few days a number of granulations appeared on the dura mater, which gradually spread and assumed the appearance of gristle; and, finally, the work proceeded regularly, until a substitute for the original bone and teguments was formed, and the part cicatrized. If these operations were not performed by the *vis medicatrix*, they must have been effected by the different *ointments* that were applied in the cure; and if the surgeon proceeded according to art, he must have applied an *ossific ointment*

ment first, to *generate matter* to form a new bone; and, in the next place, a *sarcotic* ointment, to generate muscular flesh; and, lastly, a *cutanific* ointment, to generate matter for completing the skin; and, if he could have procured some *capillific* ointment, he might have clothed the patient's new scalp with hair; but, as it was war time, this ointment could not be obtained, and, therefore, this part of the business was left unfinished.

YELLOW FEVER.

THE method of cure I would recommend in this direful disease, is—To bleed the patient immediately, if he is of a sanguine plethoric habit; but if not, it may be omitted; and then put him into a bath of pure soft water, heated to the 96th or 98th degree of Fahrenheit's scale; rubbing the body all over with soft flannel about fifteen minutes; then put him into a warm bed, and give him an infusion of the bark of wild alspice, (called also spice-wood and fever-bush) drawn like tea in boiling water, close covered, of which he may take an half gill every fifteen or twenty minutes, until he begins to sweat: he may also take whey, made by scalding a pint of sweet milk and half a pint of water together, and, while it is hot, add Madeira or good Lisbon wine in a small stream, stirring it slowly with a spoon until it separates; if it is not quite clear, strain it off, and let the patient take it warm, to act as a cordial, and to support him under

der the perspiration which it promotes, and which should be continued four, five, or six hours if he bears it well, as by that time almost every troublesome or dangerous symptom will be removed: he then should be cooled cautiously and by degrees, and the bed-clothes should be changed for those that are very dry and well aired. By these means, the stomach and bowels are preserved from the action of that active, stimulating matter, which, by velicating and corroding them, produces the black vomitting and purging.

IF the patient should not begin to sweat soon after taking the infusion and whey, the quantities of each may be increased. Then heat a large brick in the fire, wrap it in soft flannel wet with spirits or brandy, and lay it between his legs above the ancles, and remove it when the sweat breaks out. This should be done at any time if the feet and legs are cold.—If he sweats freely, and complains of being too warm, the bed-clothes should be lightened by degrees; and, as the sweating proceeds, it will cool him safely and more effectually than cold water, which has been too frequently applied.

When sweating is over, if the bowels of the patient are loaded and uneasy, a glyster of the most lenient kind should be injected, and repeated once every day, if it should appear to be necessary, until he recovers, which will seldom exceed three days, if he is treated in this manner from the first hour of the attack, and supported with light nourishing diet; such as panado, sago, salep; and, upon the third day, he may be allowed chicken broth, with light
wheat

wheat bread, or two or three small oysters slightly scalded in the shell, for dinner.

ALTHOUGH I do not believe that the genuine yellow fever has a much greater septical tendency than the small-pox, yet I am convinced by what I have observed, it frequently happens, that when persons predisposed by breathing a putrid air, or making a too free use of animal diet, in very hot weather, are attacked with some contagious disease, be it dysentery, small-pox, or yellow fever, the fever will be of the putrid kind. This circumstance should be carefully attended to by the physician, from the beginning; and if any symptoms of putrefaction should appear, such as the tongue and fauces being covered with a dark brown viscid sordes, which adheres to the teeth, or dark livid spots on the skin, it is a matter of indifference by what appellation the original epidemic was denominated, it is now a putrid fever, and should be treated with antiseptics. If the circulation be rapid, and the heat of the body greatly increased, draw a strong infusion of good ground malt in boiling water, strain it off, and add to a pint of it while milk warm, two table spoonfuls of the best yeast, and a table spoonful of Muscovado sugar, keep it warm, and when it is in brisk fermentation, give the patient a wine glass full every hour, or if the symptoms are urgent, every half hour: if the patient is thirsty, good fresh butter-milk will be the best drink, as it not only prevents, but has frequently cured the black vomit, as long ago as the days of Hippocrates; and I have cured children in putrid fever with butter-milk alone. But when the heat

abates, if the signs of putrefaction increase, add half an ounce of Peruvian bark; Virginia snake-root, one drachm; and columbo root, two drachms, to a quart of the malt infusion, sweeten it with Muscovado sugar, and ferment it with the yeast, and give it as above directed. If the blood should be so much rarefied and dissolved, as to burst from the nostrils or other out-let, draw a strong infusion of red roses in boiling water like tea, sweeten it with loaf sugar, and render it gratefully acid, by the addition of a few drops of the elixir of vitriol, and give the patient a table spoonful every second hour; and continue the fermenting antiseptic infusion. If the hemorrhage cannot be checked by these means, dissolve two drachms of allum in half a pint of water, and give the patient a table spoonful every second or third hour, with 30 or 40 drops of tincture of gum kino in each dose, until the hemorrhage begins to abate; when this should be discontinued, and the use of the antiseptic infusion persisted in.

THIS method of cure will doubtless appear to be very simple and trifling, in such a dreadful disease, which has excited too many physicians, even those of great professional knowledge, to attack it with the most powerful remedies.

THE reason why I would cautiously avoid giving any thing very stimulating or heating in this fever, may be obvious to any physician, who will only advert to this circumstance—that there will be a preternatural flow of juices, to whatever emunctory is stimulated to an uncommon degree: if the salival
ducts

ducts are stimulated with tobacco, the nostrils with snuff, the stomach by an emetic, or the intestines by a cathartic, the determination of the fluids will be to these organs; and as the stomach, liver, and intestines are the parts that are most severely affected by this direful disease, it certainly appears to be the most eligible practice, to endeavor to determine the flow of this extremely active deleterious matter to the skin, where it can be expelled without danger, rather than invite it to the stomach and internal viscera, by acrid heating stimulating remedies. Vomiting is the most troublesome and dangerous symptom in this disease; and the judicious Sydenham observed above one hundred years ago, that when the stomach was so irritable, that it ejected every thing that was taken, if he could get the patient to sweat, the vomiting ceased: the reason is so obvious that it needs no explanation. Besides, every person who has attended a patient on the three first days of the fever, must know, that the heat and energies of the system are excited to an extreme degree, and therefore should not be augmented by any means, in this stage of the disease. Neither should the patient be debilitated on the three first days of the fever, by profuse evacuations of any kind; for, when the powers of nature cannot operate, medicine becomes worse than useless. I have known some instances of black vomiting and purging, attended with evident symptoms of putrefaction, finally conquered by taking the antiseptic infusion freely, and having it injected twice or thrice every day.

ANASARCOUS

ANASARCOUS DROPSY.

TAKE of the bark of prickly-ash, two ounces and an half; the root of the American sarsaparilla, common elder, and horse-raddish, of each three ounces; burdock seed and iron filings, of each two ounces; juniper berries, one ounce and an half; Lisbon or Teneriffe wine, one gallon; cut the roots very small, pound the bark and bruise the seeds, and infuse the whole of the ingredients in wine, for three days, when the patient may begin, and take half a wine glass full every third or fourth hour, and either augment or diminish the dose, according to its operation. The ingredients should remain in the wine.

WHEN the feet and ancles begin to swell (if in the spring or summer) pound a large quantity of the leaves of elder in a mortar into a soft pulp, and apply it as a poultice to the parts that are swelled, at bed time; and when it is removed in the morning, wash the parts affected with spirits or brandy. If it happens in winter, the bark of the elder may be scraped off very fine, pounded till soft, and moistened with equal parts of spirits and water; apply it warm, and when it is removed, dry off the parts; and wear woollen stockings and flannel if the weather is cold.

IT is also serviceable to rub the swelled part with a flesh brush, or warm hand, to render the humors moveable.

IN some instances, I have found it necessary to give one smart purge of calomel and jallap.

IF the viscera are sound, I believe this method of cure to be almost infallible, and perfectly safe. I once knew a woman, of seventy years of age, cured of a deplorable dropsy, by means nearly similar to the above; and, when I was fourteen years old, I cured a man of the dropsy, by a strong infusion of prickly-ash bark, who had been deemed incurable.

HISTORIES OF CASES.

PUTRID FEVER.

IN the winter of 1778, Dr. M. Treat was seized with a putrid fever; and, at the same time, my face was swelled and extremely painful, which confined me to my room. When Dr. Robert Johnston found that Dr. Treat grew worse daily, he urged me to venture out to see him; affirming, that he would die if I did not, as the other hospital physicians, who attended him, had mistaken his disease for a nervous fever, and were treating him accordingly; whereas, he (Dr. Johnston) was positive, that the case was highly putrid. The circumstance which led them into this error was, that the patient had subsultus tendinum.—I was wrapped up, and taken in a sleigh to his lodgings, where I found him stupid, speechless

less and insensible, with almost every symptom of a speedy dissolution. He had a dose of musk given him for the subsultus; and immediately began to take the antiseptic infusion, in the most active state of fermentation, all that afternoon, and through the night. When I called to see him next morning, he had recovered the use of his speech, but was much deranged. I asked him if he knew me? He looked at me some time, and then inquired, whether I was not that strange doctor who had lately come to town? I directed them to persevere with the antiseptic infusion; and, when I called to see him next day, he discoursed cheerfully and sensibly, and soon recovered strength and spirits.

IN the summer of 1778, a soldier was brought to the hospital, whose breathing was almost the only remaining symptom of life. I ordered the matron to make him as good a bed as she could, and immediately prescribed the antiseptic infusion, which he took through the night. I was ridiculed for prescribing for a dead man, which increased my anxiety to save him. I called early next morning to see him, and still found him stupid, speechless and insensible. I ordered him to be carried out in his bunk and set in the sun-shine, covered lightly with the bed-clothes. But when the bunk was discovered at the door of the ward, the laugh was again repeated against me, as it was taken for granted, that my patient was dead; however, I persevered, and before night he recovered his speech, and in a few days perfect health.

THE remedy on which I chiefly depended in putrid fevers, before I discovered the virtues of yeast, was an infusion of the bark with Virginia snake-root, in boiling water, to which one third or one fourth of Madeira wine was added when cool, which was sweetened with Muscovado sugar. But this medicine was not given until the violent heat and rapid circulation began to abate. Until this took place, I gave lemonade and other vegetable acids ; and, when I discovered the urine of the patient to be frothy, I gave elixir of vitriol largely diluted with water. This dangerous symptom is caused by the great heat and putrid ferment melting the fat, and converting it into a destructive soap, that assists in destroying the crasis of the fluids, which is immediately checked and prevented by the acid of the vitriol.

WHEN I lived in Amenia, Dutchess county, in the winter of 1763, I was consumptive, and was confined to the house from some time in November. I observed that I grew more feverish than I had been before, and lost strength rapidly. I soon discovered that my urine was very frothy ; and, as I was at that time ignorant of the cause (my brother being absent who could have informed me) I went and consulted several authors, some of whom pronounced it a most dangerous symptom, but appeared to be as ignorant as myself, both with respect to the cause and cure. I was too weak to try experiments upon myself ; but knew, that something must be done speedily, or not at all. I, therefore, put some of my urine into six small cups, and put different drugs into five of them without producing the least change
on

on the froth. I sat down almost discouraged, and began to consider that my urine had much the appearance of soap suds, and that soap was made by combining alkaline salts and oil with water; that probably the salts of my blood were alkalescent, and united with the oil to form this destructive soap. Encouraged by this conjecture, I put a few drops of elixir of vitriol into the remaining cup; when, to my inexpressible satisfaction, the froth was immediately dissipated. I then went, without delay, and took the elixir in water, which cleared my urine in less than twenty-four hours.

Soon after I had made this discovery, as my brother, Doctor Thomas Young, had his horse saddled to go to Hartford, he was sent for, to visit a lady in the vicinity, who began to complain that morning; as it was but a few rods off, he ran over, and when he returned, he told me he thought it would be a nervous fever; he went off, and I prescribed for her, but soon finding that she grew worse, I refused to do any thing more, until they brought another physician to see her, who appeared to be certain that her fever was nervous; she took her medicines one day longer, when I was informed that she was very bad. I then resolved to see her, although at the apparent risk of my own life, as I was very weak indeed. I was wrapped up and carried to the house, where I found her expiring with an highly putrid fever. After death, she continued quite warm and limber for several hours.—I mention this case, to show the fatal effects of mistaking one disease for another; and also to show, that when the putrefac-
tive

tive ferment is very active, it can generate and maintain the heat of the human body a considerable time after circulation has ceased.

IN about six or eight days after the death of this lady, Mr. C. A. an intimate acquaintance, who had visited her in her sickness, was seized with the same fever, and sent to me to prescribe for him; but the painful remembrance of what had so lately happened, by prescribing at random, caused me absolutely to refuse prescribing for him, without seeing him first. I, in consequence, took another journey of about half a mile, wrapped up as before; I found his fever clearly marked, his tongue very foul and almost black, trembled greatly when he put it out for inspection, his urine thick and frothy, with great weakness and dejection; I gave him the elixir vitriol in spring water, on the first day on which I visited him, and when the violent heat abated, he took the antiseptic infusion, with Madeira wine, as above mentioned; and in three days after I visited him, he came to return mine.

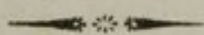
IN Albany in the year 1768, I visited a child about two years of age who had a putrid fever; its tongue and mouth were dry and black; I prescribed the above antiseptic infusion, which it would not take; I therefore advised its mother to give it butter-milk, which it drank with avidity, and recovered. Query, Would it not be well to try the virtues of *butter-milk*, in the black vomiting and purging in the yellow fever, as it is certainly both cooling and antiseptic?

If the experiment is made, the whole of the milk should be churned together, without being skimmed; neither should it stand longer before it is churned, than is necessary for the separation of the butter from the milk, and no warm water should be used to hasten the separation.

CONFLUENT SMALL-POX.

A. N. a lad of about 18 years, had the confluent small-pox very severely, his head and face swelled greatly, and when the swelling of his head subsided, he grew quite stupid and insensible, and breathed with difficulty. I was sent for, and found his hands and feet quite lean: I remembered Doctor Huxham's prognostication, that under these circumstances, the patient must soon leave the world; I therefore omitted doing any thing for him: as he breathed with great difficulty, I was persuaded that the matter which had swelled his head, had fallen on his lungs, and could not be removed. I was informed next morning, that he was not dead; I called to see him, and as I could discover no great alteration, I told his people, that it was not impossible that a purge might carry off the matter, and relieve him; they wished it to be tried, and I gave him a smart one, which operated well, and in less than ten hours he began to speak; and by the use of a few more gentle purges, and the vinous antiseptic infusion, he recovered perfect health.

ON the 23d of April 1795, I inoculated a young man named Stevens, and gave him his medicines with written directions; he went and took a lodging in a very small room, in which there were two beds, and only one very small window: the weather proved very wet and warm. I did not know where he lodged, and did not see him until the eruptions were considerably advanced; at which time the greatest part of his face was black, especially about his eyes, and almost every pock on his body was filled with dissolved blood, and the blood springing from the sockets of almost every tooth in his head. I was greatly alarmed to see him in this condition, but reposing almost an unlimited confidence in the virtues of the antiseptic infusion, I encouraged him to take it, and not to despair of a speedy recovery; which was effected in less time than I could have thought possible, by means of this valuable specific: for such I esteem it, in all cases that are really putrid; such as external mortification, scurvy, putrid fevers, putrid or ulcerous sore throat, &c. &c.



MANIA.



I HERE intend that kind of madness, which evidently appears to be caused by the excessive activity, or agitation of the spirits; which is indicated, either by an extreme degree of mirth, gaiety, cheerfulness, laughter and singing, or lively outrageous passions of a disordered mind.

IF the patient is plethoric, take away a moderate quantity of blood; then give a purge of jallap with a few grains of nitre, and next morning a dose of ipecacuanha, with one grain of tartar emetic.

TAKE ten grains of camphire, and a few drops of spirits, rub it in a mortar until it is dissolved; then add a small quantity of a pretty thick mucilage of gum arabec, and rub it until it is perfectly mixed; then add eight ounces of the best cider vinegar, by degrees, rubbing it all the time until it is perfectly mixed.

NEXT morning, after the patient has taken the puke, he must begin and take two table spoonfuls of the camphorated julap, every third or fourth hour, shaking the vial well, to mix the ingredients.

WHERE the other remedies cannot be procured, good cider vinegar should be given alone immediately upon the first appearance of this species of insanity, to prevent the complaint from becoming inveterate.

I AM convinced, from what I have experienced of the efficacy of this mode of practice, that it will seldom fail: as I can affirm with truth, that it never deceived my most sanguine expectations.—I still treated my patients with confidence and good humor, and invariably found it returned. I was once called to visit a young lady, and found her sitting on the bed-side with a number of her friends in the room, who dared not to come near her; I went immediately and sat down beside her, while the people
in

in the room cried out, O, Doctor, take care! she will tear you to pieces! I sat still, and told her that I would be her friend, and protect her from insult; I gained her confidence, she took the camphorated julap, and recovered the perfect use of her reason in a few days.

I HAVE been baffled in attempting to cure melancholy madness, which is owing to an opposite state of the fluids and spirits, and consequent torpor of the nerves.

HYSTERIC PILL.

TAKE asafœtida, one ounce; sagapenum and gum ammoniac, of each half an ounce; compound powder of myrrh, one ounce and an half; rectified oil of amber, two ounces, or as much as will be sufficient to reduce it to a mass for pills.

ANOTHER.

TAKE sagapenum and asafœtida, of each one ounce; myrrh and gum ammoniac, of each half an ounce; Castile soap and shining wood soot, of each six drachms; rectified oil of amber, a sufficient quantity to reduce it into a mass; five pills may be made out of each drachm, and one taken every fourth hour, in hysteric and hypochondriac fits, and in all spasmodic complaints, which are not attended with fever.

ALTERATIVE PILL.

TAKE precipitated sulphur of antimony, two ounces and an half; calcined mercury by itself, finely levigated, half an ounce; gum of lignumvitæ in fine powder,

powder, three ounces ; camphire, half an ounce ; oil of sassafras, a sufficient quantity to reduce it to a mass, to be made and used exactly according to the direction for the next recipe.

ANOTHER.

TAKE gum of *lignumvitæ* in fine powder, four ounces ; camphire, half an ounce ; calomel prepared, three ounces ; golden sulphur of antimony, an ounce and an half ; oil of sassafras, three drachms, or a sufficient quantity. Dissolve the camphire in the oil and a few drops of spirits, into a very thin consistence, add the guaiac in fine powder, by degrees, pounding smartly in an iron mortar, until it grows soft, then add the calomel and golden sulphur of antimony previously well mixed in a glass mortar, work it in the mortar, until all the ingredients are perfectly blended together into a smooth mass. Make 12 pills out of each drachm ; and take one every night at bed-time in all cases in which a mercurial alterative may be necessary : these pills will be found to be both safe and efficacious.

DEOBSTRUENT PILL.

TAKE succatrine aloes in fine powder, two ounces ; Castile soap and the best flake manna, of each one ounce ; oil of anise seed, a sufficient quantity to reduce it into a mass for pills. Make 12 out of each drachm ; one of which may be taken at any time of the day, occasionally as a laxative, to resolve and carry off foul viscid matters from the bowels, thereby preventing costiveness and obviating the numerous evils incident to this condition : they produce the
most

most salutary effects in cases in which the bile is inert, and viscid juices accumulating.

FISTULA LACHRIMALIS.

THE fistula lachrimalis, is a disorder of the canals leading from the eyes to the nose, which obstructs the natural progress of the tears, and makes them trickle down the cheeks.—I had frequently seen attempts made to cure this disorder, by passing a fine flexible probe through the lachrimal sack and duct, into the nostrils; but I considered this method as vastly troublesome, both to the operator and patient, and not always completely successful.—I therefore resolved to embrace the first opportunity that presented, to try a less troublesome mode, which I hoped would be more successful. My intention was to abate the acrimony of the humors, remove obstruction, destroy the callosity of the duct, and keep it open by frequently injecting soft warm mucilaginous infusions of red elm bark, in pure soft warm water.—Some time after I had settled this plan in my own mind, a man applied to me, with a fistula lachrimalis completely formed.—I dissolved one grain of corrosive sublimate in two ounces of pure rain water, and applied it to the affected part, with a small soft hair pencil: in a short time the swelling abated; when a small quantity of the above solution was gently forced into the lachrimal sack, by means of a small syringe, which soon made its way through the duct into the nostrils. I continued to inject the solution every

every morning; and three or four times through the day, injected the thin mucilage of red elm bark, about milk warm, which performed a perfect cure in about a month. Shortly after, another person applied, laboring under the same disease, and was cured by the same means.

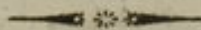
THERE are two circumstances attending this complaint, and its cure, which has induced me to conceive, that it is produced by animalculæ, invisible to the naked eye, getting into, and harboring in the lachrimal sack, viz. An intolerable itching at the beginning, and the immediate relief from that keen sensation, by the application of the mercurial solution; which is known to be destructive to every kind of insect.

FISTULA IN ANO.

HAVING succeeded so well in these two cases, I was encouraged to undertake to cure a man, who had three or four fistulous ulcers, one of them communicating with the rectum 3 or $3\frac{1}{2}$ inches up.

I MADE a solution of two grains of the mercurial sublimate to an ounce of good French brandy, which was injected into each of the ulcers, once every morning, by means of an ivory syringe. For a while at first, the fistulous parts were insensible to the stimulus of the solution; but by degrees, the parts became irritable and soon healed. This happened

happened in the year 1776 or 1777, and I have reason to believe, that he has remained perfectly free from any similar complaint.



SCROFULA—OR, KING'S-EVIL.



TAKE volatile ammoniacal salt and gentian root, of each a drachm and an half; Jamaica spirits, twenty ounces; mix and let it stand three days, and take a table spoonful twice every day, upon an empty stomach. And take three grains of alterative powder every night at bed-time, and take nothing that is sour.

TAKE Peruvian bark in coarse powder and seneca snake-root, of each two drachms; unslacked lime, four ounces; boiling water, one pint; grind the lime with the bark and root in a mortar, adding the water by degrees, let it stand six hours, strain it off, and take two table spoonfuls every third hour, with as much sweet milk.

WHEN scrofulous tumors are recent, apply tincture of cantharides with old soft linen, so as not to raise blisters. If this application does not soften or discuss the tumor, pound garlic into a soft pulp, add a few drops of cream, and apply it as a poultice, every night at bed-time. If the tumor breaks, dress it with a strong infusion of wild cherry bark in lime water, applied with lint, and covered with a plaster to exclude the air.

PHTHISIS PULMONALIS.

ALTHOUGH I have had ample experience in treating the diseases of the breast and lungs, the difficulty of discussing this important and complicated branch of pathology, in the small compass I have assigned to myself, had nearly discouraged me from touching the subject. For although every disease in which the lungs are affected with tubercles, vomica or ulcerations of any kind, attended with a cough, hectic fever, night sweats, and wasting of the body, is generally denominated consumption; yet, as their causes are extremely different, they require a very different mode of treatment.—And although some general rules may be suggested, yet much must still depend upon the sagacity and skill of the attending physician, not only to discriminate the different cases from each other, but to accommodate his remedies to the different stages of the same disease; as it frequently happens that the remedy that would produce the best effect in the morning, would prove extremely noxious, if given at night. Consumptive patients are generally too cold and languid in the morning, occasioned by profuse night sweats, and consequent debility; and in the afternoon are very feverish: it is therefore obvious, that strengthening balsamic remedies are indicated in the forenoon, and cooling remedies in the afternoon; such as the best dulcified spirit of nitre, ground ivy tea, *whortle berries*, when they can be procured, are an excellent remedy in hectic fever,

fever, and should be kept by every apothecary, properly preserved.

SCROFULOUS consumptions, which are the most difficult to cure, are caused by an acid of a peculiar kind, which coagulates the lymph, and obstructs the lymphatic glands; of this I have had sufficient evidence, by opening scrofulous tumors which contained coagulated lymph, exactly resembling curds and whey, and smelled very sour. The patient should take two grains of the alterative powder every night; and an infusion of two ounces of Peruvian bark, and one ounce of seneca snake-root in a quart of lime-water, may be taken through the day, in doses of two table spoonfuls every second hour, mixed with an equal quantity of sweet milk. The *lime-water* neutralizes the acid; the *snake-root* is a powerful stimulant and attenuant; and the *bark* an excellent corroborant: and I think it probable, when the Peruvian bark cannot be obtained, that wild cherry bark will answer as well, and probably better. The balsamic electuary may be given with much advantage, after the acid is conquered and obstructions removed.

THE mildest kind of consumption, is that which succeeds the rupture of a blood-vessel in the lungs of a person previously enjoying good health. If a physician is immediately called in, he should take a moderate quantity of blood, from the largest vein he can raise in one of the patient's feet; and give him small doses of a powder, composed of one part nitre, and two parts of loaf sugar, repeating it at short intervals,

intervals, until the hemorrhage is checked. The next intention should be, to mitigate the cough, and bring up the extravasated blood, which may be attempted by small doses of the paregoric elixir; flax-seed tea, sweetened with loaf sugar; tea of good fresh liquorice root; and a linctus made of spermaceti; a small quantity of balsam capivi and honey, melted over a gentle fire, and constantly stirred until it cools; a small lick may be taken occasionally to check the cough; a small piece of Spanish liquorice may be taken in the mouth at bed-time, which being swallowed while the patient sleeps, prevents the cough. The patient should be admonished to keep very still, and to use no violent exercise for some weeks, or even months, and neither to speak loud, or sing.—In five or six days after the last fresh blood has been brought up, the bulk of an hazlenut of the balsamic electuary may be taken every fourth hour.—The reason why I wish the blood to be taken from the feet, in preference to the arm, is owing to an accidental discovery which I made many years ago. Being called to a man who bled to that degree from a ruptured vessel in his lungs, that he did not cough and bring it up by degrees, but it ran constantly from his mouth, so that I expected he would be suffocated; I immediately ordered warm water, with an intention to open a vein in his foot, and let the blood flow until he ceased to bleed from the lungs. When I examined his legs and feet, they were as cold and pale as if he had been dead, without the sign of a blood-vessel; but after they had been well rubbed for about two minutes, in water that might be rather called hot, than warm, the veins expanded, the skin appeared

appeared florid, and the hemoptoe ceased; and as he had lost a great quantity of blood, I did not open a vein, but gave him the above powders, with lubricating and anodyne remedies to mitigate the cough, and the balsamic electuary completed his cure.—Although it is absolutely necessary that the patient should avoid all kinds of severe exercise, especially lifting any considerable weight, it is however indispensibly necessary in *this*, as well as in most cases of great debility, that the patient should use as much very gentle exercise, as he can bear without fatigue; he should use a light cooling regimen, and avoid the use of every thing spicy, spiritous or heating, and for a considerable time, keep his feet and ankles dry and warm; and a cold damp air should be avoided, especially when the winds blow from the north-east or south-east, or drinking any cold liquor while he is warm.

CONSUMPTIONS are more frequently caused by sudden exposure to a current of cold damp air, after being over-heated, either by exercise or the heat of a room, than by any other means. In this case the lymph is inspissated, and obstructs the bronchial and pulmonary glands, producing a frequent cough, and fever. If the cough be violent, and the patient feverish, attended with pain or soreness in the breast, a vein should be opened, and a moderate quantity of blood taken. If there is any fixed pain in the breast, dissolve twenty grains of camphire in one ounce of sweet spirit of nitre, and apply a pledget of old, soft linen wet with it, to the part affected, and cover it with a warm moistened bladder,
or

or apply a bladder half full of warm water, and repeat it until the pain is relieved. If the fever is severe, give 50 or 60 drops of the best dulcified spirit of nitre every second hour, in whey or catnip tea, until the fever abates. If he is hoarse, or his breast or lungs sore, he should receive the steam of an infusion of the herb called balsam weed, or everlasting, through the pipe of an inverted funnel, with his breath, and repeat it frequently. Costiveness should be prevented by the most gentle cathartics, or injections.

Let us doubt what we will, this one axiom is sure,
That timely prevention is better than cure.

BUT if application has not been made in time, and it appears that an abscess or vomica is forming in the lungs, the steam ought to be inhaled frequently, and the current of the spirits and fluids diverted from the part affected, by stimulating the external parts, nearly in connexion with the lungs, by the solution of camphire in spirit of nitre or ether, applied frequently, and covered with a bladder half filled with pretty warm water. This application will sometimes raise blisters, which produce a more salutary effect than those produced by cantharides, as I have frequently experienced.

AFTER the inflammatory fever has abated, the following balsamic electuary, with such variations as may be indicated by particular circumstances, is of more extensive use in consumptions of the lungs and internal ulcerations, than any remedy I am acquainted

ed with :—Take conserve of red roses, two ounces; balsam capivi and the genuine powder of liquorice root, of each two drachms; loaf sugar and mucilage of gum arabec, of each one drachm; mix the balsam perfectly with the sugar and mucilage, then add the conserve and powder, and, if the conserve is not moist enough, as much honey, or soft extract of liquorice root, as may be necessary to give it a proper consistence. If the expectorated matter be thin, acrid, or foetid, owing to a scorbutic or putrid taint, add a few drops of elixir of vitriol, to render it gratefully acid: this addition will assist in checking night sweats; but he must also take a strong infusion of good barley malt, in an active brisk state of fermentation.

If the patient is too cool and languid, two or three drachms of the tincture of the balsam of Tolu may be added. The dose may vary from the size of an hazle nut to that of a small nutmeg, every third or fourth hour. But if the matter expectorated is very viscid, incorporate two drachms of gum ammoniac in eight ounces of a strong infusion of seneca snake-root and elicampane in boiling water, and let the patient take a table spoonful every third or fourth hour, until the matter is attenuated; and then proceed with the electuary with the tincture of Tolu.

BUT, to insure success in the treatment of diseases of the breast and lungs, it behoves the physician to discriminate with accuracy respecting the cause; to attend to the effects produced by his medicine, and, if they appear to disagree, either diminish the dose, or change
it

it for another of the same class ; he must enjoin his patient to rise early in warm weather, and never to sit still in a strong current of air ; to use gentle exercise abroad in the cool of the morning and evening, provided the air is mild and dry ; and, when confined to the house, to take a few turns through the room every fifteen or twenty minutes. Indolence in one extreme, and imprudent exposure in the other, destroy thousands that exercise and prudence might save.

THE efficacy of wild cherry tree bark as a medicine, appears to be but little known in America, except by the native Indians, who use it with great success in both external and internal ulcerations. The first knowledge which I acquired of its virtues was from a man who had one of his legs ulcerated to the bone, almost from his knee to his ankle, which had been cured by an Indian squaw, with the wild cherry tree bark, after it had been given up and deemed incurable by the surgeons in New-York, when he returned to Long-Island, where he lived, resolving to submit to his fate. Some days after he returned, a squaw happened to call at the house, and, seeing him sit with his leg all wrapped and bolstered up, enquired what ailed it. He told her it was very badly ulcerated. She requested to see it opened, saying, " may be I can cure it." To which he replied, " that it was not probable she could cure it, after the surgeons in New-York had pronounced it incurable." She, however, prevailed on him to let her examine it ; upon which she gave him great encouragement, and he agreed to let her try her skill. She then got a large
quantity

quantity of the wild cherry tree bark, some of which she spread out to dry; and made strong infusions of the fresh bark in boiling water, which she injected into the numerous ulcerations by means of a syringe which he had brought with him. She proceeded in this mode of treatment, until she had effectually cleansed every ulcer. She then powdered her dry bark; and, after cleansing the sores, she filled the holes that reached to the bones full of it, which remained, covered over with pledgets and compasses dipped in the infusion of the bark, until the next morning, when she washed all the powder out, injected the ulcers with the infusion, and dressed it as before. In a few days the patient felt so much relief from this mode of treatment, as encouraged him to persevere; and, in about two months, he was able to walk about. When I saw him, some months after, he had travelled several miles on foot.—This remarkable cure induced me to embrace the first opportunity to give it a trial. Many cases occurred of less importance, in which the virtues of the bark were conspicuous. At length a man applied to me, who had one of his legs and thigh increased to a monstrous size by an œdematous swelling. I advised him to make strong infusions of the bark in boiling rain water, and to bathe or foment his leg twice every day; and every night to wrap it in flannel, wrung out of the infusion pretty warm; and if he should be affected with sickness at stomach, to take a smart purge. After he had proceeded in this manner about ten or twelve days, he was seized with violent sickness, and resolved to take a purge in the morning; but as a diarrhea ensued, which carried
y off

off the whole of the stagnant matter, he recovered perfect health, and his leg regained its natural size, without the use of any internal remedy.

I HAVE also experienced the efficacy of an infusion of this bark in consumptions of the lungs and internal ulcerations; to the trial of which I was led by observing its extraordinary effects in external application.

WHEN Skeenesborough was first settled, the inhabitants were much afflicted with the ague, and frequently came to Albany for medicine. Conceiving that many of them, being new settlers, could not bear the expense, I advised them to make a strong lye with the ashes of white walnut or grape-vine, and to decant it off clear. Then to take four ounces of the strongest vinegar in an eight ounce vial, and add the lye, in small quantities at a time, as long as an effervescence ensued, or until it neither tasted like lye nor vinegar; then fill up the vial with water, and take a table spoonful every second or third hour for four days; after which, take a half gill of the infusion of wild cherry bark, every second hour, until a cure was performed: and I was afterwards told, that it proved as efficacious as the Peruvian bark.

UNICORN grows in a light sandy soil, frequently where the yellow pine flourishes. The leaves that make their first appearance in the spring, are much like the first leaves of the Indian corn; those which come out afterwards are narrow and sharp-pointed; the stem grows about six inches high, with a spike of
white

white flowers at top ; the roots are generally from three-quarters to an inch long, and blunt at the end, having no tap-root ; the sides are beset with numerous small hard fibrous roots ; the taste is bitter, but not disagreeable.—This root, reduced to a powder, and made into an electuary with honey, infused in good Madeira wine, or even an infusion with boiling water, is equal, if not preferable to every remedy that I have ever known, in dyspepsy, and pains in the stomach. This root might be procured in any quantity by the apothecaries, for about 2s. 6d. per pound. They should also procure and keep in their stores, the inside bark of the red elm, which is by others called slippery, from its quality of forming a mucilage with warm water ; the out-side rough part of the bark should be removed before the inside is taken off, which should be spread out and perfectly dried, before it is packed up, otherwise it will mould and become useless. The virtues of this bark are very extensive : in scalds and burns, soft old linen wet with the mucilage of this bark, gives almost immediate ease. If a person seized with the inflammatory quinsy, will begin immediately to sip a warm infusion of this bark, in soft water, holding it in his mouth, and gargling it in his throat, it will seldom fail to effect a cure, unless the inflammatory diathesis is very prevalent ; in which case, venesection and nitrous remedies should not be omitted. It is of excellent service in all cases in which the fluids are acrimonious, being drank warm, and continued for some time.—In dysentery, when the internal mucous is abraded, and the intestines sore and painful, it should be drank warm very frequently ; and in tenasmus,
it

it should be injected, with the addition of 60 drops of laudanum, and repeated as occasion may require.

It is also the remedy used by the female natives of America, to facilitate parturition. About ten or twelve days before they expect to lie in, they begin to drink warm infusions of the red elm bark, and continue it daily, until they are delivered; which renders that dangerous and painful operation of nature, so safe and easy, that they require no assistance, as other women do. At this time, they retire to some private place alone, and in a short time return with their infant in their arms. I have prescribed the remedy for more than twenty years, and do not remember one case in which it was not successful. Mrs. P n, a woman about 24 years of age, who had borne two or three children with extreme pain and great danger, after lingering in labor for many hours, until her life was despaired of, she was rescued from death by a skilful surgeon, by means of the forceps. Some months after, on discovering that she was pregnant again, she was inconsolable, being strongly impressed with the idea, that she could not survive the approaching period. In this dilemma, she was told by some of her female acquaintance, that I was possessed of a remedy, that rendered parturition safe and easy. When I visited her, she told me that each subsequent delivery, had been more lingering, painful and dangerous than the preceding one, and that if the ensuing delivery should prove more difficult than the last, she could not possibly survive, as in that, she had but an hair breadth escape for her life. I endeavored to console her, and to inspire her with confidence

confidence in the virtues of a medicine, which I promised to provide for her to take, about ten or twelve days prior to the period which filled her with so much dread ; in which I succeeded so well, that she went on cheerfully to her time. When I gave her the bark, with directions to infuse small quantities of it in boiling water, until it grew slimy, and take half a gill of it warm, every third or fourth hour through the day, I told her, when she felt those pains that precede and accompany parturition, that she should not defer sending for her midwife. One morning perceiving some symptoms which indicated the approaching change, she told her husband to go immediately for the midwife, repeating what I had told her ; he had scarce a quarter of a mile to go, the midwife hurried along, and arrived in time to dress the babe, &c. &c.

IN the preceding stages of my life, I have been actively employed in the service of my fellow-beings ; but, being worn out and superannuated, I offer them this little book, probably as my last tribute ; and if its utility but equals my intention, it will add one more gratification to a person, who wishes every created being, every degree of happiness and pleasurable sensation, which their beneficent Creator has fitted them to enjoy.

END OF THE PHYSIOLOGICAL TREATISE.

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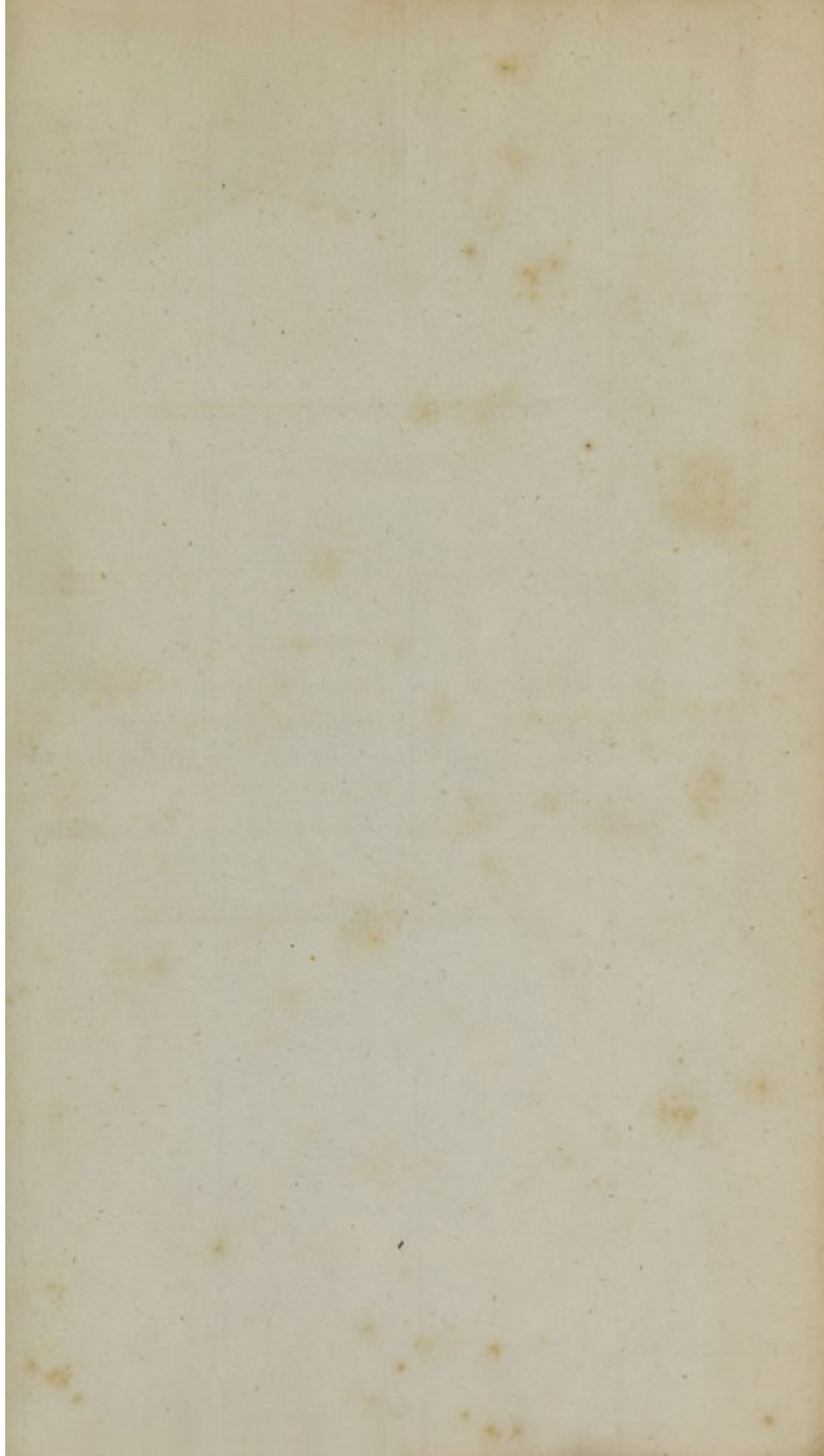
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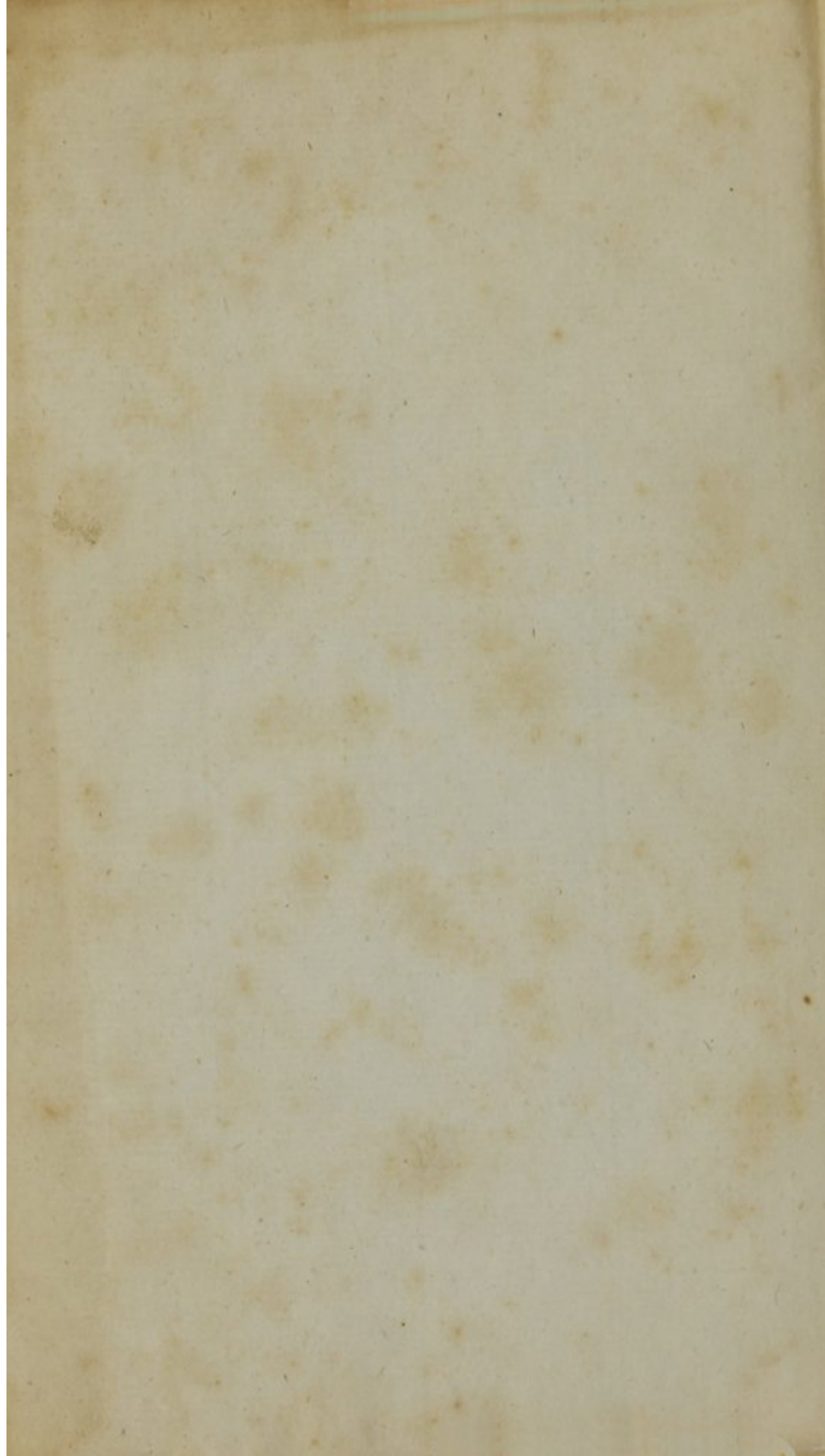
THE PHYSIOLOGICAL TREATISE.

Introduction, page lxxv. 5th and 8th lines from the top, for
conclusive read *convulsive*.

Treatise page 91, 7th line from the top, for *Æctous* read
acetous.

————— 101, 5th line from the top, for *volatizing*
read *volatilizing*.





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