STATEMENT

OF

IMPROVEMENTS

IN THE

THEORY AND PRACTICE

OF THE

SCIENCE OF MEDICINE.

BY THOMAS EWELL, M.D. &c.

OF WASHINGTON CITY.

"Slave to no sect, I seek no private road,
"But look to nature." POPE.

PHILADELPHIA:

PRINTED FOR THE AUTHOR,

BY JOHN BIOREN, AND FOR SALE AT NO. 88, CHESNUT STREET.

1819.

TO

THOMAS JEFFERSON,

(LATE PRESIDENT OF THE UNITED STATES)

ALIKE

THE PATRON OF GENIUS

AND

BENEFACTOR OF HIS COUNTRY,

FOR MORE THAN HALF A CENTURY

THE CHIEF OF THE STATESMEN,

AND

THE ORNAMENT OF THE PHILOSOPHY

OF

AMERICA,

I DEDICATE THE FOLLOWING ATTEMPT

TO IMPROVE MY PROFESSION, WITH

ALL THE VENERATION INSPIRED BY

THE VIEW OF HIS TRANSCEN-

DENT VIRTUES,

THOMAS EWELL.

Philadelphia, March, 1819.

ADVERTISEMENT.

IT is due to myself to state, that the plan upon which the printing of these pages was commenced was subsequently changed.

It was my first intention only to have printed the detached papers I wrote at different times and published: hence the reader will find some pieces headed as copied from the Medical Repository; an accident which would not have appeared so singular according to the first intention of printing.

I am sensible that the style in which I have written, with obvious haste in many parts, is exceptionable; nevertheless I would not take time to improve it, being only solicitous about the matter *and the* utility: *A better dress can be given by those who have more leisure. I shall rejoice in every effort of others to disseminate the facts and theories contained, which I believe to be improvements in medicine. Nor will this rejoicing cease, if those I have complained of, or their friends, attempt to do all the injury they can to the work.*

THOMAS EWELL.

Philadelphia, March, 1819.

ERRATA.

The reader is requested to correct the following errors, which have escaped detection.

PAGE.	LINE.
22,	6, for *cartery*, read cautery.
43,	10, for *ventricular*, read ventriculæ.
64,	last line, erase *not*.
73,	4, for *that man*, read that of man.
„	22, for *considerable*, read inconsiderable.
82,	11, for *originates*, read originate.
„	13, for *chilopoctic*, read chilopoetic.
96,	11, for *military*, read miliary.
105,	13, for *medicatries*, read medicatrices.
108,	23, for *parts*, read pores.
109,	19, for *administration*, read admiration.
155,	28, for *has of*, read has men of.

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ADDRESS

TO THE

PRACTITIONERS OF MEDICINE

IN THE

UNITED STATES.

GENTLEMEN,

A RESPECT for the opinions of the thinking part of mankind is coeval with a respect for oneself; to be indifferent to their approbation, is to be most unworthy of it. A share of philosophy much beyond our common portion, is necessary for our remaining satisfied with the good rendered to others by our improvements. Take away the prospects of fame, and you paralize some of the best features of the mind; you tare to pieces the strongest incentives to exertion and virtue. Under these circumstances, an injury to one of the faculty, affording an example of successful spoliations on the inventions of another, must become an injury to the whole; must impede the progress of our science, which should bring down the reprobation of all who make honesty the basis of their actions.

The success with which several of the Philadelphia Medical School, have palmed as their own the discoveries of others, on the faculty of this country, has long been remarkable to a few. In the course of the observations I shall have occasion to make in different parts of this work, you will find examples betraying an assurance in plagiarism, equal to

any on record. These examples with the theft of some of my own improvements, induced me to think of and suggest a plan whereby the evil might be arrested.

The remote cause of the evil, I am certain lies in the manner in which the professors are appointed; by trustees unacquainted with the science of medicine and consequently not judges of the merits of the candidates. The consequence is, that instead of the selection of persons best qualified to teach, those are preferred who have most personal friends among the trustees. This opens the door to intrigue; sycophancy and imposture enter and the interests of science are retarded to promote the fortune of a favourite. In confirmation, you will find all the medical schools of eminence filled on their establishment, by those who have distinguished themselves among the faculty; they give renown to the University, which attracts thousands from a distance; the chair becomes too profitable for a doctor of mere genius; and on the death of those who created the reputation of the school, it is given to the parasite. Hence the innumerable universities which have "shone as a meteor," and passed away. Take in illustration the University of Pennsylvania; what was its reputation in the days of Shippen, of Rush, of Wistar and Barton; its real founders? What is it now? a question, the answer of which you would not be at a loss to divine, if you will advert to the manner in which the vacancy occasioned by the death of the great and the good Dr. Wistar, was filled. It is worthy of being recorded as a sample of "intrigue among trustees." Dr. John A. Smith, a man of such transcendant talents, that he was called from Virginia to be professor of anatomy in the University of New York; and from New York to Virginia, to be the president of the College of William and Mary, it was believed from his eminence would have been called to the chair. The professors wrote to him a letter requesting him to accept the chair, to which he consented as stated in the public prints. Of course the friends of Dr. Smith and of the reputation of the University, thought no further effort or explanation ne-

cessary to secure his appointment; their attempts were naturally paralised. In the mean time other friends were active, and when the time came to make the lucrative appointment, behold one of their own company graciously received it! The only good resulting from this manœuvre was that the eyes of many students were opened, and the Universities of New York and of Maryland, reaped essential advantages by the increase of their attendants.

It should also be stated as contributing to the same effect, the manner in which the students are taxed to gain their diplomas. The anxiety of every young man to graduate is well understood. To fee a professor by being his pupil, at 100 dollars a year, is an acceptable mode of obtaining the object; and so successful to the professors that sometimes only one of them can enumerate more than *sixty private pupils;* affording materials no doubt for future farces grounded on doctors! Nor is this enough to satisfy the thirst for the scholar's cash. Text books are indispensable; some are compounded; others are reprinted with notes generally better neglected than read, and then with their name at the back of the author's book, it is to be sold at rates greatly exceeding the fair value. Instead of atoning for their want of talents by furnishing all means to promote the studies of the young gentlemen, one would suppose them opposing their progress to prevent the discovery of their incompetency. Instead of inculcating a liberal spirit of inquiry and a fair estimate of the labours of others; the suggestions and improvements only of their favourites are recommended. To assert for oneself, to dare to deviate from the course they point out, is to excite an anger and opposition becoming such teachers, but not becoming such a science as they profess.*

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* It is but just to state that Robert Hare, M. D. professor of Chemistry, was not then of the University. He has a mind of the great and liberal stamp, incapable of an ignoble act. Dr. Hare afforded the public some entertainment, by publishing the letters of Dr. Chapman,

It would be an advantage to the sciences of the world, and especially to our country, if the whole system was revolutionized. Lawyers and clergymen appoint their own heads and why should not physicians. It is a disgrace to our faculty that the teachers of the profession should be selected by persons strangers to the science. We only are qualified to choose. Let us gentlemen unite and petition every legislature to cause the chairs of the Medical Schools to be filled by the votes of the regular bred physicians of the country. Legislatures will grant the petition; and the evils I have mentioned and many more attendant on the present schools will vanish. Our science will make an advance gratifying to its friends and to the friends of humanity. I beseech each of you by the dearest interests of our profession to keep this in your view until the end is accomplished. What a stimulus! how high the honour of a medical teacher! elevated by his brethren knowing his worth, instead of by the artful means played upon the ignorant.

Before concluding this address I have to account for my blending different parts of our profession together in the following pages. My reason is grounded on the belief that medicine and surgery should always be practised by the same man. This is the opinion of Dr. Thompson, of Edinburg, and Mr. Abernethy, of London, two of the greatest teachers of the age. The variety they afford in the occupation of

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from which it appeared that he had been recommending two for the Chemical chair!! Dr Patterson and Dr. Hare! assigning the most strange reasons! This corresponded with an earlier specimen of his conduct. His inaugural essay he dedicated to his preceptor, Dr. Rush, calling him the "Sydenham of America," and "the medical veteran of the western world." Will it be believed, that a little time after, he could have carried a challenge to Cobbet, the scurrilous writter of the "Rush Lights," and seized every opportunity to abuse his master? The physicians of America would never have selected this man to be a teacher, however plausible his manners.

the mind, most tend to rouse and improve it. A continued routine of but one course of business tends to beget dullness and inaptitude to improve. This is strikingly exemplified by regular farmers and merchants who become cultivators of the soil; the first jog on in the old way, the other perceives errors at a glance and improves upon the practises, as observed by Mr. Adam Smith, with a rapidity greatly exceeding that of the regularly trained agriculturalist. So in study we gain more knowledge from occasional relaxation, than from incessant application. My ideas are better illustrated by the following extracts from a work entitled "Experiments on the Bile," by J. M'Lurg, M. D. believed now to be of Richmond, in Virginia, a work written with such elegance, that it has had its beauties borrowed by more than the present professor of the practice of physic in the University of Pennsylvania.

"The mere arts may be improved by repeated subdivisions; but those which partake of the nature of sciences require a different method of cultivation. It is the remark of a celebrated historian, that the art of war, for some centuries the only object of attention to all the gentry of Europe, acquired little improvement in the hands of men who despised every other sort of knowledge. A personal dexterity in the management of their arms was common enough; but an extensive system of operations required an acquaintance with principles, which mere habit could never teach.

"The reader, I hope, will not find any thing whimsical in this comparison of arts, which have equally the appellation of murderous; nor be led to fancy that a dogmatic and an empiric differ like a Mareschal Turenne and a savage warrior; chiefly because the former pursues more scientifically his destructive schemes.

"But if there is truth in what has been said, nothing can be more absurd than the vulgar notion of a certain quackish dexterity in medicine; which leads men to confide in ignorance, supported by its constant companion, presumption. This notion, which tends to degrade physic from the rank

of sciences, is not even applicable to surgery; though it is confessedly more purely an art than physic.

"The celebrated Petit, of Paris, constantly declares in his Lectures, that the separation of physic and surgery is unnatural; and that it would be for the advantage of both, again to unite. Yet, as far as simple dexterity is concerned, the chirurgical art has certainly been improved by the separation. We may appeal to those fine manœuvres, for which the oculists, aurists, and dentists of the present times are so much celebrated.

"But it is not from the dexterity which we see displayed in artificial productions, that we are to judge of what is required in operations on the animal machine. In the former, it is art which does every thing; but in the latter, all the nicer changes are performed by nature, who completes and finishes what the medical artist rudely prepares. It is not, therefore, a mere dexterity which we require in a surgeon. We expect that he should be acquainted with the powers of the machine, and be able to tell "quid ferat, atque faciat natura." And thus, his art is so strictly connected with medicine, as to justify the remark of Petit; and though, in a few cases, it may be useful to practice them separately, they should certainly be studied together."

FROM THE MEDICAL REPOSITORY,

VOL. II. PAGE 135.

A Case of LUNACY. *Addressed to the Editors, by* THOMAS EWELL, *Student of Medicine in Virginia.*

ENGAGED in the study of medicine, and desirous of extending my knowledge in anatomy, I lately undertook the dissection of a man who died in Dumfries (Virginia) last May. The occurrence of several unexpected phenomena induced me to prepare and offer for your consideration an account of the case.

It was with difficulty I could collect any information relative to the former affections of the subject. The little I did, served as an incitement to make further inquiries. This rendered my regret the greater, when I found the following only could be obtained.

The man was named Benson, about 35 years old. For several months previous to his death he had lost his ordinary understanding. At first the symptoms of idiocy were only occasionally betrayed. These gradually became more remarkable, and of longer duration, till he had no intervals of sound sense. Still, however, at particular periods, there was considerable difference in his state; the disease being increased by various exciting causes. His appetite was extremely depraved, and his habits equally irregular. Being very capricious, he would take at one time but little nourishment; at another he would eat it in large quantities with voraciousness. Notwithstanding the perversion of his mind,

he was pleased with ardent spirits. In this state unusually small quantities would render him intoxicated. Without a home, he was obliged often to encounter the inclemencies of the weather; and from its sudden vicissitudes he was rarely sheltered. The charitable hand occasionally extended its aid to relieve him; but it was inadequate to the providing him accommodations in a house with persons to take care of him. From the irregular periods at which he took and could obtain food, his disease was increased; an exacerbation of all his symptoms was the concomitant of a full stomach. The indirect operation of alcohol was also attended with the same effect. When he had taken much food, or used ardent spirits in excess, he rarely missed a fit before the effects were off. During these there was a loss of voluntary motion: convulsions supervened, which terminated in the restoration of volition in the course of an hour. After the fit, an old woman who saw him told me he seemed much weaker than usual. The violence of these paroxysms increased with their frequency; till at length, after a remarkable transition in the weather from heat to cold, he was seized with one near the town, and died in the night on the public road. On the ensuing morning, in conjunction with Mr. William M. Weems, student of medicine, the dissection was commenced. According to the usual mode, the abdomen was opened. We were forcibly struck with the morbid appearances which presented themselves. The enormous bulk of the stomach, and the uncommon distension of the intestines by flatus, were alike remarkable. In order to procure a full view of the parts, the sternum, with the connecting cartilages, was removed. This being done, we found the lungs had undergone formerly considerable inflammation. They adhered on all sides to the thorax and diaphragm. Their adhesions were stronger than any I had ever seen. The new membrane connecting the inferior lobes to the diaphragm was sensibly the thickest and most unyielding.

The pericardium contained about two ounces and a half of serum. Considerable adipose matter had accumulated

about the heart. Large polypous concretions were found in the left ventricle.

The stomach was, as near as I could ascertain, twice the common size. The appearance of the exterior coat was not natural; it seemed to have been considerably inflamed. A small aperture, giving vent to the flatus, reduced its magnitude as well as that of the adjacent parts. Still, however, its bulk was equal to that of most stomachs. On pressure, a hard, moveable substance was felt in the cavity. An incision being continued across the stomach, we found it considerably thicker than common. The muscular coat appeared twice the usual thickness: its fibres were distinctly seen and remarkably red. The internal or villous coat, as might be expected, was but little corrugated. In some parts it had a dark blueish hue, which appeared to have been the consequence of inflammation. Excepting a small quantity of mucus and gastric juice, nothing but this hard mass was in the stomach, which accidentally was broken before it was extracted. When the parts were held in contact it had a curve, and was not unlike an injected stomach. Its size was about equal to a common pine-apple. Indentations could be easily made on it with the thumb; and, when cut with a knife, a little grit was sometimes felt. Its weight was about eighteen ounces. The duodenum, about three inches below the pylorus, was contracted to half the size. The stricture was not more than half an inch in length. A similar one was in the rectum, four inches above the anus. The epiploon or omentum was bundled up in the left hypochrondium. We saw nothing more diseased among the viscera, except the spleen. This was not half the usual size. We attributed its diminution to the pressure of the distended stomach. Does not this favour the opinion that the office of the spleen is to contain blood, which is pressed out by the distended stomach when we eat, for the purpose of increasing the secretion of the gastric juice?

I could not ascertain whether the contents of the cranium were in a morbid state or not.

The above appearances sufficiently show the very diseased condition of his primæ viæ. I was at a loss how to account for the formation of this curious substance in the stomach. It had not sufficient grit in it to justify my ranking it among the calculous concretions found in the stomachs of some dissected by Morgagni, or those reported in the Sepulchretum of Bonetus. But the preceding inflammation of the adjoining parts (the pleura of the lungs) enabled me to form some idea of its formation. The increased action of any part is attended with increased heat; more especially in the lungs, where the morbid action in the blood-vessels must accelerate the oxydation of the blood, the generation and elimination of heat must be considerable. From the promity of the stomach this stimulus must have been imparted to it, and increased the action of the excretions opening into its cavity. The stricture in the duodenum preventing the passage of this mucus, must have been the primary cause of the disease. The more fluid parts escaping, must have increased the density of the remainder, which may have united with grit occasionally taken in. It not being soluble in the gastric juice, it could not be affected by it. The ball stimulating by distension the stomach, must have increased the action of the excretories. The secretions uniting with the ball increasing its bulk, must have rendered it still more stimulating; so that the effect increased the cause. The spasmodic contractions of the stomach, which it must have excited, account for the uncommon thickness of the muscular coat. The remarkable connection between the brain and stomach has been too often observed to need notice here. It is equally well known that many of the acute pains of the head proceed from sympathy with this viscus. Hence the great relief obtained from medicines which restore it to its healthy state. It does not appear unlikely that many chronic affections of the head may originate from the same source; nor is it less likely, that medicines, acting powerfully on it, might mitigate some of the sufferings of those labouring under mental derangement.

The present case affords a strong presumptive argument. The exercebation of the symptoms from large quantities of food, the increased susceptibility of the stomach to be acted on by alcohol, together with the appearance after death, corroborates the idea. The respectable Dr. Saunders, from experience, recommended the exhibition of a remedy in "sick head-ache," which acted solely on the stomach. This was his favourite diluent, "pure and tepid water." Its utility he also notices in biliary and dyspeptic complaints. Since so judicious a physician has prescribed so simple a remedy, may we not venture on it in other diseases alike arising from sympathy with the stomach? Exciting a convulsive action in the stomach, accompanied with a free use of warm water, would probably have relieved Benson. The same practice may have its advantages in other cases. I am conscious that a great authority is opposed to the exhibition of emetics, attended with a supposed turgescence of the blood-vessels of the brain; but observation is a better guide than authority. I have more than once seen marks of returning sensation in maniacs and drunkards, during the nausea preceding the operation of emetics. Whether they remove spasm, rouse the *vis med. naturæ* into action, equalize excitement, or accelerate the solution and expulsion of extraneous substances from the stomach, they seem equally proper. The free use of a diluent may be of incalculable service, simple as may be supposed the practice.

ADDITIONAL.

The above paper was published before my obtaining the degree of doctor of medicine, and shewn by me to all my fellow students at the University. Doctor Joseph Klapp,

was one of these. Some years after, (not long since,) he has published an essay on "Temulent Diseases," recommending the use of emetics, in mental derangement, without making the least acknowledgement for the source of his "discovery." He has managed to make most of the Philadelphia physicians believe, that he is the author of the doctrine of the stomach, being often the seat of the disease, and of the practice of relieving by emetics. The date of the above publication is sufficient to shew to whom it belongs; and I have great satisfaction in stating that I have often used the remedy in such cases, as did years after, Dr. Klapp, and many physicians in this place, with remarkable success; shewing that it is entitled to general introduction. I would always recommend exciting great irritation on the skin, by hard rubbing, cupping, &c. after the daily use of the emetic, as one of the means of relieving the stomach.

Observations *on the* Union *of* Arteries, *and the* Treatment *of* Aneurisms: *Communicated in a Letter from* Thomas Ewell, M. D. *of Virginia, to Dr.* Miller.

NOTWITHSTANDING the glaring folly of those who pretend to practise without theory, there are many declaring that theories are of no consequence. A practitioner who had his full portion of public confidence, once told me, that the futility of theories was shown by the fact, that the treatment of most fevers in all ages had been the same, although the theories differed very widely. It is true that in a few instances this was the case. But it would not be difficult to show that the practice has varied more than the theories, and that the best practice has proceeded from the application of the best principles. The hypocrisy of those who pretend to deny the connection between theory and practice may be seen in an account of the theories and treatment of hemorrhages, which have been communicated to the world.

After the dawn of scientific surgery in France, we find an eminent French surgeon, M. Petit, ascribing the cessation of hemorrhages to the coagulation of blood in the vessels. His hypothesis owed its origin principally to the discovery of a coagulum in the femoral artery of a stump after death. This erroneous doctrine produced its bad effects. It led M. Petit and his followers not only to an unpardonable neglect of the needle and ligature, but to improper practices. They were so much influenced by the idea of the coagulation of the blood, that they would prescribe such medicines as they termed absorbents, to abstract its more

fluid parts from the coagulum. To this theory of the coagulation of the blood, Mr. Marand added, that there was a partial contraction of the artery, which, however, it must be observed, led to no material alteration in practice. But a surgeon equally eminent advanced a different doctrine, which produced a change in practice. This was Mr. Ponteau, who attributed the cessation of hemorrhages to the effusion of blood in the cellular membrane surrounding the part which compressed the sides of the artery. This idea led surgeons to a more free use of the needle, and to include large quantities of flesh in the ligature. Mr. Pouteau makes the following observations: "Mais s'il est une fois avéré que legonflement des parties au dessous de la ligature fait le principal obstacle a l'eruption du sang arterial, il sera naturel de conclure que le plus ce gonflement sera considerable, le plus il opposera de resistance a l'impetuosit du sang arterial." This theory was succeeded by the extension of that of the contraction of arteries, advanced by Mr. Marand. It received a support from the respectable surgeons, White, Kirkland, and Aitkin, of England. Under its influence surgeons applied to bleeding surfaces astringents of the most powerful kind.

Mr. John Bell, in his valuable works on the principles of surgery, objects to these various theories, and advances one of his own. He refers the cure of hemorrhages to the occurrence of something like the adhesive inflammation in the inner coat of the artery.

This idea of Mr. Bell appears perfectly correct, and he might have added, that the union of the arteries must be accelerated by the pressure of blood effused in the surrounding parts, as supposed by Pouteau, as well as by the contraction of the artery, as observed by Marand.

The consideration of the above led me to conceive of a treatment of arterial hemorrhages different from the usual one. If the adhesive inflammation in the inner coat of the artery prevented the flow of blood, it appeared that this

might be more readily excited than is commonly done. When a ligature is applied to any flexible tube, so as to compress it, there are produced irregular folds or rugæ, not only immediately under, but above and below the ligature. When this is done, to stop the bleeding from arteries, particularly of the larger kind, these irregularities prove a considerable impediment to the proper union of the sides of the artery. But this is not the only respect in which the use of the ligature seems defective. It produces, in consequence of this unequal compression on the irregular folds of the artery, the ulcerative and suppurating inflammation, which is followed by the secondary hemorrhage, so often the cause of death. To prevent these inconveniences, I imagined it only necessary to bring the sides of the artery precisely and regularly in contact, so that pressure might be made equally on every part, and consequently one common action, the adhesive inflammation, excited. With this view I conceived of applying a pair of common forceps to the artery, with a screw connecting together the two handles, so that by the turning of this screw any necessary approximation of the blades could be produced. The readiness with which the correctness of my idea could be ascertained was such, that not many days elapsed before I submitted it to the test of the following experiment.

A large dog was confined, and his femoral artery laid bare. A pair of forceps of a delicate construction were then applied to it. In place of a screw, the compression was regulated by a string tied around the handle of the forceps. The wound was then bound up, and the forceps properly supported by bandage. The forceps was kept on the artery for sixteen hours, when it was removed, and the dog permitted to go about the house. In six days the wound was healed up entirely, and I killed the dog. On examining the femoral artery, very greatly to my satisfaction, I found that part of it to which the forceps had been applied perfectly united, so that a probe could not pass, and the limb was supplied with

blood by anastomosing branches. This experiment was successfully repeated by myself and one of my friends, remarkable for his accuracy. We contemplated making other comparative experiments, and operating on the abdominal aorta of the dog, but could not conveniently make the necessary preparations.

I shall not at present say any thing concerning the good that appears likely to result from the use of such an instrument as the above forceps in amputations, and in divisions of the large arteries in any part. Having not yet been favoured with much business in my profession, I cannot speak from experience; but I must hope that those who have opportunities will be pleased duly to consider this subject, and apply the forceps in such cases as in their eyes may seem expedient.

Of the treatment, however, of aneurisms, I beg leave to say something. The many attempts that have been recently made at innovations in the method of cure, clearly show that there remains room for improvement. Of these I will take a cursory review.

In a few instances Heister and some others have used compression successfully. But the insufficiency of this method did not require an extensive experience to disclose. It was found necessary to tie up the artery, and the celebrated Ruysch was the first who ventured to tie the brachial artery in the city of Amsterdam. The use of the ligature has since been extended; and it seems astonishing that it was reserved for the great Mr. Hunter to introduce the practice of tying up the femoral artery in popliteal aneurism. Tying up the artery is now universally practised in aneurisms, from dilation as well as those from punctures, since the unsuccessful efforts of Mr. Lambert and others to sew up the orifices. In aneurism of the popliteal artery, Mr. Hunter proposed applying one ligature to the artery just before it perforates the tendon of the triceps adductor muscle. This did not succeed as effectually as was wished, in the hands of

others. Mr. Pott operated in one instance, and in consequence of the too long detention of the ligature, such abscesses and sinuses were formed as obliged him afterwards to amputate the limb. In other respects the ligature has proved hurtful. It has frequently been the cause of the secondary hæmorrhage, which so often proves fatal. The difficulty of regulating the compression by the ligature is such, that it is sometimes drawn too tight, so as to produce an immediate gangrene underneath it, and consequently too early separation of that part of the artery; while, in other instances, it is not drawn sufficiently tight, and is, consequently, too long retained. It was afterwards proposed to apply two ligatures, and to divide the artery between them, in order to prevent the too long retention of the ligature; and Mr. Cline, to prevent the ligatures from coming off, advised passing the needle through the cut ends of the artery. It requires no great discernment to discover that this could have no influence when the ligature is drawn so tight as to produce underneath an immediate gangrene. The too great irritation, and consequently tendency to ulceration, caused by applying a bit of cork or leather to the artery, excludes them from use; and the same objection may be justly urged against applying four ligatures, and leaving two loose, to be tied only in case of the secondary hæmorrhage. The difficulty of applying the ligature to a deep seated artery is no inconsiderable objection to its use. Mr. Home observes, that the expert operator, Mr. Pott, was some time engaged in taking up the femoral artery; and, with much illiberality he intimates, that it was not certain even then that the artery was included in the ligature. In one instance I saw the brachial artery a little dilated, and it was some time before Doctor Weems, who operated, could draw the ligature sufficiently to stop the hæmorrhage.

The instrument recommended by Mr. Duschamps, has no advantage over the above methods, and is consequently not used. It will therefore be unnecessary to urge as an objection to its use, its complex nature. But that accomplished scholar, Professor Wistar, made a more plausible suggestion. He applied a wire around the artery; and regulated the compression, by pulling this wire through a silver cannula. Unfortunately, however, this did not succeed. The sharp edges of the wire and cannula probably caused the tetanus which followed, while the irregular folds in the artery, the ulcerative inflammation and secondary hæmorrhage were not guarded against. It is to this gentleman's great candor and generous exertions to instruct his class that I am indebted for this experiment.

After most maturely considering this subject, I have no hesitation in concluding that the forceps might be applied with great advantage. When the artery is exposed to view, where it is usually done, it could then be applied to it, and properly supported by bandage for a few hours. I am inclined to advise the treatment of aneurism by the forceps in preference to all other methods, for the following reasons:

1st. The forceps can be applied with facility, by less skilful persons than the needle and ligature, without including the nerves, which, from their firm substance, are found to resist the cutting of ligatures.

2d. It can be removed as soon as the adhesive inflammation is excited in the artery, which will probably be in twenty hours, and the complete recovery will be in one fourth or fifth of the usual time.

3d. The pressure can be regulated at will, so that nothing can be dreaded from too much or too inconsiderable a degree of compression.

4th. The artery not being divided, and the pressure

being regular on the sides, there will be no danger of a secondary hæmorrhage.

5th. As the forceps will be removed in a few hours, there will be no danger of abscesses, &c. which follow the continued irritation of ligatures.

6th, and lastly. The sides of the artery being brought properly in contact by the forceps, the union will not only be more speedy, but more effectual, than when the ligature is used.

These considerations have determined me to use the forceps in the first case entrusted to my care. Should it appear to others worthy of a trial, they will, no doubt, make the necessary allowances for the usually diseased state of parts in the human subject affected with aneurism.

The above use of the forceps suggested so many years ago, I have ever since considered as of great importance to surgery. During my practice in the Navy Hospital at Washington, I had but one case, and used the forceps with complete success, of which indeed I felt certain before the trial. Professor Wistar, when I explained my ideas on this subject to him, expressed the strongest approbation of the plan, provided the application of the metal to the living fibre did not produce tetanus, as it had in a case where he applied a metallic wire. To guard against such an occurrence, the forceps may be made of ivory, bone, or even wood; or at least the common forceps might be covered with leather or linen. There is always great difficulty in introducing new practices in

surgery; it was long before the suppression of hæmorrhages by fire gave way to the use of ligatures: and the same may occur before the ligatures will give way to the forceps: but sooner or later it will be the case—as it has advantages over the ligature greater than those of the ligature over the actual cartery. Any one who will make the experiment on animals will find that the compression of the artery by the blades of the forceps, will prove effectual in causing the union of its sides, in much less time than he would imagine. The irritation of their bulk will not hinder their union by the first intention, after removing them.

My friend Dr. Hartshorne of Philadelphia, had a case where the ligature after amputation remained near twelve months before its removal. Doctor Mott, of New York, lately tied up the arteria innominata, where the ligature remained till the seventeenth day, when ulceration came on, and consequently the succeeding hæmorrhage in a few days, which destroyed his patient. This case, lately published in New York, presents itself to my mind, as one in which the forceps would certainly have proved successful.

A ligature made of animal substance, as cat-gut, leather, &c. has been recommended about the same time by Dr. Physick, and a British surgeon. This rots and comes off in a short time. The great objection of making irregular folds in the artery, holds good in this instance; and in addition, it may and will come off too soon when the matter is of a corroding nature. It is also found to be followed by serious abscesses, inflammations, &c. as stated by Dr. Mott, and experienced by all who have used the "animal ligature." Indeed, that any man in his senses would let the life of a patient depend upon such a perishable article, is to me a subject of surprise. However, I consider the use of this ligature for small

arteries an improvement on the old practice; yet as a few hours squeezing the sides of the artery with the forceps will answer, I would not recommend its use.

The difficulty of applying the needle to deep seated arteries, is a powerful objection to its use. This was felt so strongly a century ago, that they had to resort to a contrivance to push the needle. They made a handle on the principles of the dissecting forceps, with a ring falling down over the blades, to compress tight the needle armed with a ligature. This certainly must be of great assistance in applying the ligature and ought to have been in the hands of every surgeon. A representation of this forceps, as a handle to a needle will be found in James' Surgery, vol. 1st, in table 26, also in table two, by mistake as stated. The same is represented in Heister's Surgery; and he calls it acute naculum, and says the French surgeons call it Portaiguille. James says, "It is a manubrium, a handle for a needle contrived for the mere commodious management of it in operations."

Now will the reader believe that after such an explanation by such respectable, though obsolete authors, that Dr. Physick could have fancied himself the inventor of putting a needle in a forceps? He not only claims the honor, but throughout the country he has received great credit for the INVENTION! It is difficult to decide which is the most remarkable, the making or the giving credit to such a statement.

I would lay it down as a rule, in every case where a ligature is called for, according to common surgery, apply the forceps. In those cases of umbilical herniæ, where it is recommended to apply a ligature to obliterate the sac, the application of the forceps with two bodies to the blades, of the length of the sac to be compressed, will prove of great advantage. The dangers of peritoreal inflammation, from the irregular folds

caused by the ligature, will be prevented. The proper construction of the forceps for such purposes, will occur to all having the cases for their application. I will conclude these remarks with the injunction, that when two sides are to be made to unite, bring those sides as equally in contact as possible, so that they may be equally compressed for speedy union.

A LETTER *on* CALORIC; *addressed to Dr.* MITCHILL, *by* THOMAS EWELL, *M. D. of Virginia.*

SINCE I had the honour of being with you, I have made two experiments which completely establish the doctrine of the materiality of heat, denied by Count Rumford and other respectable philosophers. Your love of truth has induced me to hasten to communicate them to you, and I hope the result will give you satisfaction.

It is highly probable that the doctrine of the materiality of heat is considered generally correct, notwithstanding the specious arguments urged in opposition to the theory. There is, however, no positive proof on which the opinion rests. The chemists have displayed great ingenuity in explaining the various phenomena produced by heat. With great readiness they have accounted for facts which are apparently contradictory. They have assigned good reasons why heat diminishes the bulk of some bodies, as argillaceous earth, while it enlarges most others; why cold, or an abstraction of heat, lessens the size of most substances, while it increases the bulk of water about to congeal; and they have given good reasons why all the experiments they have instituted to ascertain the gravity of heat have failed. The celebrated *Muschenbroeck*, has also evinced great ingenuity in support of his doctrine of frigorific particles. As it would be useless to undertake to refute all the arguments

advanced in support of the hypothesis, I shall proceed to relate my experiments.

I procured a pair of excellent scales, of so nice a construction that their balance could be destroyed by one-fourth of a grain. Two ounce vials nearly half filled, one with concentrated sulphuric acid, and the other with common water, were tightly stopped and exactly weighed. After I ascertained very precisely the weight, I poured the water of the one vial into the acid of the other, and, to prevent evaporation, immediately replaced the stoppers. The heat, as is usual on making such mixtures, was very considerable. As soon as all of it had escaped, so that the equilibrium in the temperature was restored, I weighed the vials with great caution a second time. On doing this I found that the loss of weight was equal to one grain and a half; which loss could have proceeded only from the conversion of latent into sensible heat, and its consequent escape.

After performing the above experiment, I proceeded to the second in the following manner: As recommended in the Philosophical Transactions for 1787, by Dr. Beddoes, on behalf of Mr. Walker, I procured eleven parts of the muriate of ammoniac, ten of the nitrate of pot-ash, sixteen of the sulphate of soda, and thirty-two of water. The weight of the whole, with the vial containing the water, was precisely two ounces. I suddenly added the salts to the water, and directly corked the vial to prevent the condensation of the water in the surrounding air. The cold which followed, was considerable, and continued so for several minutes. When the mixture ceased to absorb the sensible heat of the air, with the greatest care I wiped off all the water that had been condensed on the exterior of the vial before a warm fire. The vial with its contents was then weighed, and I found that the weight was increased half a grain, which addition

could only have proceeded from the absorption of sensible heat through the vial.

Of the correctness of these experiments any one may satisfy himself if he proceed with proper caution. Should there be any variation in the results, I believe it will be inconsiderable. The first experiment appears more conclusive than the second; and, in justice to one of my former fellow students, I ought to observe, that during a conversation I had with him, on my proposing the second experiment to ascertain the materiality of heat, he suggested the first. From a constant exchange of sentiment which I enjoyed while at Philadelphia among the students, the gentleman has escaped my recollection.

That various substances have their capacities for heat altered, that some unite with heat, while others give it up, as originally suggested by the great Dr. Black, there can now be no doubt. The heat must chemically combine with such bodies, and in proportion to the quantity there must be a change of properties. The properties depending on the latent heat appear to me more important than seem generally believed. They appear of such consequence, that I think some of the processes in animals depend in a great measure upon this combined caloric. The process of respiration has long occupied the attention of many philosophic observers. Perhaps their not succeeding in the investigation depended on their supposing the mystery of the operation was proportionate to its importance. The theory of Lavoisier, the immortal father of French chemistry, has long since been refuted. It is scarcely possible that hydrogen and carbon could unite in the lungs to oxygen, without occasioning a destruction of the parts by the sensible heat that would be eliminated. The fixed air and halitus said to have been formed during the combustion of carbon and hydrogen must be simply an exhalation from the lungs, or

an execretion. The theory that followed the above appears no better. According to this we must suppose that phosphorus exists formed in the blood, that oxygen unites with this phosphorus, although it be combined with the blood, and that the phosphoric acid then unites with the iron, to form the colouring matter. Equally destitute of foundation appears the hypothesis, that oxygen unites with the blood. In the first place, what proof have we that the chemical combination of the air can be destroyed by the blood? and in the second place, if the base of oxygen gas were to unite in the lungs, would not the sensible heat of the blood in other parts of the body convert it again into the gaseous state, and cause death, just as oxygen gas does when injected in the blood vessels? But these theories do not explain many facts which are presented to our consideration when examining the phenomena of respiration. Among these I will mention great coldness of the body, notwithstanding a free circulation of blood; and at other times excessive heat, while the circulation is scarcely discernible. I have no hesitation, after reflecting on this subject, in saying, that the true theory of respiration remains to be revealed; and I should be highly gratified if the following opinions should be found to approach nearer to the truth.

That the air contains a considerable quantity of latent as well as sensible heat, is unquestionably shown by so many facts, that I need not relate any in this place. That the air may have its capacities for heat altered, like most other fluids, when the circumstances in which it is placed are varied, there can be no doubt. That the circumstances of the air when pressed down into the delicately organized air-cells of the lungs are materially changed, is equally certain. That the blood is changed by change of circumstances, and that the organization of the blood vessels in the lungs differs from that of most other parts

of the body, no one will deny. Now from this view of facts it appears to me that the air loses its capacity for latent caloric in the lungs, that the blood at the same time acquires an additional capacity for this caloric in the adjacent vessels, and consequently the caloric of the air immediately unites with the blood, and gives it the new properties of redness, capacity to stimulate the animal fibre, &c. &c. This theory will enable us to account for many facts which come daily under our observation.

As the capacities of fluids to take in or give up heat depend on the state in which they are, and also as the organization of parts is known to vary considerably, we are led to expect the irregular appearances of heat on the surface of the animal body. Accordingly we find that in general only a certain quantity of heat is given up by the blood when it arrives near the skin; but when the state of parts is altered, there is a great difference in the quantity. When the coldness is inconsiderable, the blood acquires the power on the surface of the body to convert the sensible heat of the air into latent heat, and to combine with it just as it does in the lungs. This combination on the skin we believe to be precisely the same as that in the lungs. Hence redness, &c. is often acquired by the blood on parts that are inflamed. Dr. Klapp's experiments to disprove the absorption of oxygen from the skin do not militate against our doctrine. It is upon these principles that I would account for the escape of heat from the body after death for several hours. The altered state of the vessels would naturally produce a change in the capacities in the fluids; and as this change would be but slow after death, so would the escape of heat continue for some time.

Our theory is corroborated by the fact that nitre and the acids have the power of increasing the irritability of the animal fibre. Fontana has proved that the blood, when

of a proper quality, gives this irritability to fibres. This quality of the blood is acquired from the air, and as we believe from the latent caloric of the air. As the body of caloric exists in considerable quantities in acids, and as this caloric gives the irritability to fibres through the medium of the blood, we are led to conclude that the additional quantity of the caloric existing in the acid would impart to the blood an additional power to give irritability.

With your permission I would make the following queries. May not chemists be mistaken in their idea that there is such a body as "the base of oxygen gas?" May not all the changes said to be produced by oxygen depend on the caloric which is combined in different degrees with substances? For example, may not the differences between atmospheric air, oxygen gas, and nitric acid, depend on the various quantities of caloric in a given bulk?

But these are only suggestions which I hope you will receive as an earnest of my desire to discover truth. Hereafter I hope to prosecute the subject with more success.

FROM THE MEDICAL REPOSITORY, OF 1808.

ACCOUNT *of the internal Exhibition of the* ACETATE *of* LEAD *in several* DISEASES: *communicated by* THOMAS EWELL, *M. D. of Washington, to Dr.* MILLER. *Containing also a proposition to relieve the* STOMACH *from* POISON, *by the use of a* CATHETER.

LAST August I was requested to visit a cartman, John Steins, addicted to drunkenness, and living near the navy yard, in an unhealthy situation. In the night he had been seized with fever, which was followed by a profuse discharge of blood from his stomach and anus; his wife said he had lost more than two gallons! and I found him with no pulse, looking exactly as a man dying from loss of blood.

His alarming situation called for some powerful stimulus; but it occurred to me that his liver had been affected, which preventing the passage of blood through the vena portæ, was followed by that engorgement of the viscera, which had caused the rupture of the blood-vessels of his bowels; and consequently that a stimulus would only serve to increase the power of the vessels to discharge the remaining blood. I immediately determin-

ed to give the sugar of lead. On adverting to the urgency of the case, as well as the state of his stomach, which had been accustomed to the most powerful incitants, I directed him to take seven grains of the medicine every two hours, until the discharge of blood ceased. On swallowing the second dose, he exclaimed, "Great God, at length my guts are healed!" The discharge soon lessened, and no doubt the hæmorrhage stopt; but as a little blood (which had not been evacuted from the bowels) continued to come off, he took thirty-five grains in less than twelve hours. By degrees I gave him stimuli, and never did a man recover more rapidly: and this I considered as affording a new proof of the efficacy of free bleeding in curing fevers quickly. However, the man never could get over that particular pallid countenance, peculiar to those bled too copiously.

Shortly after the cure of Steins, I was called to David Mead, a drummer of the marine corps. He too was a drunkard, was fat, and indolent. He had a high fever, for which he was ordered bleeding, and a dose of calomel. In the night he was taken with a purging of blood, and I, without seeing him, directed injections of cold water. In the morning I found him almost dead; and the assistant surgeon, Doctor Harrison, pronounced "he was about to die." I ordered him to take five grains of sugar of lead every two hours: the bleeding ceased after the third, yet he took a fourth dose. His pulse began to rise in the evening, and next day I ordered him the bark: by the use of porter he soon recovered strength, though he continues very pale. He certainly lost a great deal of blood, but I cannot state the precise quantity.

On mentioning these cases to the Hon. Doctor Bibb, of the house of representatives, from Georgia—he stated that with equal success, he had given the sugar of lead to a young lady, who, during a paroxysm of fever, had

an intestinal hæmorrhage. The doses, however, which he prescribed did not exceed two grains—and the salvation of the life of his patient as certainly depended on the sugar of lead, as in the cases I have related.

My prejudice respecting the poisonous qualities of lead, being by these cases removed, I readily gave it a trial in other instances. In uterine hæmorrhage, I found it of essential service, like all who used it before me.

Mrs. A. the wife of the D—— M——, of the marine corps, aged about forty-five years, had a constant discharge of blood from her vagina, for four months; within a few days it became so profuse as to endanger her life: when called to her, I directed the exhibition of three grains of sugar of lead every two hours. The third dose relieved, and since I have heard of no further complaints. In cases of diarrhœa, I have met with the same success, from the use of lead, which Dr. Archer has stated in a former number of the Repository. But the cases in which I used it, were attended with high inflammation; and one of my fellow-practitioners told me, that the medicine uniformly failed, when the system was in a low state. Within the last month I have used it in the following case:

John Russel, a boy aged thirteen years, belonging to lieutenant Harriden, of the navy, drank at once, one pint and three gills of strong apple brandy. In a short time he had no pulse, quick respiration, and all around him thought he was dying. About five hours after the spirit was drank, I was called to him. Such was his inirritable state, that nothing which was introduced into his throat could excite vomiting. I had to rely only on external remedies, and these I applied in full force. It was only by severe general whippings, rubbing with mustard and vinegar, and finally by blisters caused by the blaze of fire, that I could excite any action in his system. In

fifteen hours I had to resort to injections of æther, brandy, laudanum, and such stimulants, to keep him from sinking. These were discontinued by degrees, until the end of the third day. On the fourth day he had most excrutiating pain in his abdomen, and serous discharges from his bowels—His pulse became highly inflammatory. Injections, purges, and prepared chalk did not relieve. In this situation I ordered him to take two grains of the lead every two hours. The third dose seemed to remove entirely the inflammation: so that in two days the boy had no other complaint but his blisters, which soon healing, he was discharged for duty. From this I conclude, that the lead is worthy of a trial in dysentery, at least after evacuants are used.

When I found the throat and œsophagus of Russel so inirritable, I unsuccessfully endeavoured to procure a probang and flexible tube, to introduce into his stomach. With the first I could have extracted some of the brandy in his stomach, and with the last probably the whole: so that the danger, from that alcohol, which had not acted, would have been removed. In all cases where poisons, such as spirits, opium, &c. are swallowed, and are followed by extreme inirritability of the throat, I have no hesitation in saying, that great relief might be afforded by introducing the end of some flexible tube into the stomach. By this tube much vapour would escape; the body could be so placed as to favour the running off of any fluid, or, at least, it would be practicable to evacuate considerably by suction: by dilution with water, and repeated evacuations, the stomach might be entirely cleansed. Indeed, my reflections on this subject have impressed me with the belief, that the introduction of such a tube into the stomach, for the evacuation of poisons, and into the rectum, up to the sigmoid flexion of the colon, for the escape of that flatus, causing colic,

will prove of as much service to mankind as the catheter has been in the evacuation of urine from the bladder. At least the practice I propose in such cases is far more reasonable than washing the stomach for some disorders by means of an instrument, which, I observe, Heister says, was done by the elder surgeons.

The last cases which embarrassed me, and in which I administered the sugar of lead, were those of salivation. In the navy hospital under my care, I find frequent occasion for the use of mercury: in many instances the salivation has been excessive, and no mitigation of symtoms could be effected by opium, sulphur, blisters, purgatives, or any medicine that has been recommended. I have seen death arise in one instance from the salivation, and have apprehended it in many cases.

This was leading me to lessen the frequency of mercury in my prescriptions, until I found a remedy in the acetate of lead. Two cases occurred in the hospital at the same time, in which the salivation was alarming in degree, as well as in duration.

It had occurred to me that the sacharum saturni cured hæmorrhagies and inflammation, by exciting the *action of contraction* in the vessels. Now, as mercury produces a contrary effect (for it really enlarges the vessels, as shown by the glands of the throat, &c.) it appeared to me that nature intended the action of one as much to counteract the action of the other in animals, as she did an acid to counteract an alkali: but be the theory correct or not, I administered lead in doses of two grains, four times a day. On the second day one of the poor men asked me for more of the medicine he took the day before. I gave it on the second day, and it was discontinued on the third, for they were both cured of the salivation. To this, I will add, that they washed their mouths with lead-water; and that the first time I

ever found a bad symptom produced by the lead was in one of these cases. Violent belly-ache came on; this soon went off; and although the symptom may oftener occur with others than it has with me, I conceive it to be no objection to its use; for, but few would prefer a month's salivation to a pain in the abdomen for a few hours.

You have now the whole account of my use of the sugar of lead. I hope others of your correspondents will experience and communicate an account of its virtues. When fair trials are made of it, I feel confident that there will be no singularity in the high opinion entertained of it as an internal medicine.

ADDITIONAL.

I have to request the reader to pay particular attention to my proposition made early in 1808, of using the catheter, to extract poisons from the stomach. This suggestion has been found of great service; the means of saving the lives of many. My friend Doctor Parish, of Philadelphia, stated to his class this winter, that it had been repeatedly used with success in Philadelphia. The pleasure I had in being the author of this means of relieving others, was interrupted by hearing friend Parish state that it originated with Doctor Physick: an error which he corrected at the subsequent lecture.

In order to enable the reader to judge of the author of the proposition, and of the means resorted to in order to deprive him of the credit, I will annex the following from the Eclectic Repertory for 1812. As it was suggested to me, that I got the idea from Heister, I will first quote Heister, vol. 2, page 2. London, English edition, 1743.

"Of the brush for scowering the stomach."

Related to the foregoing instrument, is that called the executia ventricular cleanser of the stomach, as it is called by some of our modern physicians. The directions they give for the use of it, are always to let the patient drink a small draught of warm water, before the operation, that the mucus and foulness of the stomach may be washed off thereby. Then the brush is to be moistened in some liquor, and introduced into the œsaphagus and stomach, when it is to be drawn up and down like the sucker in a syringe."

FROM THE ECLECTIC REPERTORY, OF 1812.

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"*Account of a* NEW *method of extracting poisonous substances from the stomach, by* PHILIP SYNG PHYSICK, *M. D. Professor of Surgery in the University of Pennsylvania, &c.*"

ON Thursday, 6th of June, 1812, I was sent for in much haste at 9 o'clock in the evening, to visit two children of Mr. S. B. each 3 months old. They were twins, and had been affected with the hooping cough, for several weeks. The mother informed me, that in consequence of her children having been very restless the night before, she had this evening given them some laudanum. To William she had given one drop at seven o'clock, and the same dose to Edmund forty minutes afterwards. I found William in a state of stupor, or very profound sleep, from which he could not be roused, and was informed, that just before my arrival, his whole body was strongly convulsed; his breathing was laborious, and his pulse feeble and slow. On enquiry, I found that the vial, out of which the drop of laudanum had been given, had contained, several weeks before, nearly one ounce of that medicine, but had been left without a cork, it had dried away so much that one drop only could be obtained for William; in order to procure another drop, two drops of water had been put into the vial, and stirred about, by which another drop had

been obtained, and given to Edmund; forty minutes having intervened between the two doses. About a quarter of an hour before my visit, the mother had given to William 15 drops of antimonial wine, but as it had produced no effect, I prescribed an emetic of ipecacoanha, and directed it to be given immediately; this however was found impracticable, as the child was incapable of swallowing. At half past nine o'clock, Edmund, who had appeared to be in a very easy sleep, became convulsed, and his pulse and breathing were affected in the same way that his brother's had been. We attempted to give him ipecacuanha, but could not make him swallow it. The countenances of the children became livid, their breathing very laborious; with long intervals between the times of each inspiration, and the pulse in each very feeble. Under these circumstances, it clearly appeared no time was to be lost, and therefore, as they could not swallow any thing, I determined to inject an emetic into their stomachs. For this purpose a large flexible catheter, was passed through the mouth down the œsophagus, into the stomach, and through this, one drachm of ipecacuanha mixed with water, was quickly injected by means of a common pewter syringe. In hopes that the emetic would operate, I waited some time without any effect being produced. William exhibited now every symptom of speedy dissolution, his face became very livid; the pulse and respiration had almost ceased; and, indeed the pulse could not be perceived, except a faint stroke or two, after that kind of imperfect and convulsive inspiration which is commonly observed in children just before actual death, accompanied with a convulsed action of the muscles of the mouth and neck. In this situation, I passed the catheter again, and by applying the syringe to its projecting end, drew up the fluid contents of the stomach, and imme-

diately injected warm water, which was again withdrawn.* These operations were alternated two or three times, but when completed no sign of life remained. Hopeless as the case now appeared, I injected some spirit† and water mixed with a little vinegar through the catheter; in less than one minute the child again inspired, the pulse became perceptible at the wrist, and in four minutes, with the aid of external stimuli, both went on so perfectly that there was every reason to believe the child would recover.‡ By the time that these operations were performed on William, Edmund was observed to have passed into the same condition of apparent death, from which his brother had just recovered. The same measures were adopted in his case, and with the same happy effect. I now flattered myself that the children would do well, but in this expectation I was disappointed. In about half an hour, Edmund's breath-

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* The idea of washing out the stomach with a syringe and tube, in cases when large quantities of laudanum or other poisons have been swallowed, occured to me at least twelve years ago, and I have constantly, for many years, recommended it in my lectures. In the year 1809, Dr. Dorsey performed the operation of washing out the stomach in such a case, but the patient had taken it twelve hours before he was called, so that he did not succeed. ☞Since writing the above, I have been informed that in an European Journal, a French surgeon has lately proposed injecting the stomach, my informant has unfortunately mislaid the pamphlet.

† See Medical Repertory, volume 5, page 347.

‡ It might be suspected, that the catheter passing through the fauces, would endanger suffocation from its situation over the top of the larynse, but this was not the case, because the children recommenced breathing, before the instrument was removed. I found also with my finger, that the instrument rested on one side or the other of the epiglottis, so that it could not obstruct the glottis.

ing became very slow and laborious, and his pulse which had before been very much excited, became so feeble, that he appeared to be sinking very fast. Supposing that the effects observed, might be produced by the spirit which had been given, occasioning intoxication, I determined to extract it from the stomach and to inject warm water, removing it again. This operation was very quickly performed, but at the conclusion of it, I was much distressed by seeing the little patient to all appearance lifeless. Observing in this case, that the actions of life ceased so immediately after the extraction of the spirit, I determined to try it again, and injected a little weak brandy and water. In less than a minute this occasioned a repetition of breathing and of the action of the heart, and in about five minutes both were regularly performed. The symptoms of ebriety took place also in William, but observing that his brother had been nearly lost by extracting the spirit from his stomach, I did not attempt the removal of it in William's case.

Doctor Austin, who kindly assisted me on this occasion, remained all night with my little patients. He informed me, that after some time they became better, though they both had slight convulsive motions occasionally through the night. Their bowels were moved several times by castor oil. After five o'clock in the morning, Edmund had no convulsions, but they continued with William until twenty-five minutes after nine, when he struggled a little, sighed, and expired. Edmud was troubled for two or three days with a diarhæa, but soon recovered completely."

It cannot have escaped the recollection of most readers, that Dr. Physick took a great interest in the Medical Repository, which he made the vehicle of most of his fancied *new* ideas. In the above piece he refers to

that work. Now can he pretend not to have seen it? indeed in passing through Philadelphia, shortly after its publication, I saw Dr. Dorsey and spoke to him of the subject, telling him on the occasion, although I had not his opportunities of reading, I was not quite inactive. He also read the Medical Repository; and I can only account for his neglect to impress on his uncle the truth of the case, before this publication, from his desire of letting him indulge his vanity.

It is proper in me to add, that some time after Dr. Physick published his "*New Method*," he published in some subsequent number of the same work an account of other cases he successfully treated, concluding however with a note shewing that he was not the author of the idea; nor was it the Frenchman, (I have only a little French blood in my composition,) but says, Dr. Monro, he is told, published it in his Inaugural Essay of 1797, at Edinburg, in Latin. Now as I never did or shall read a medical book in Latin, those in English being rather more numerous than I can master, no one can accuse me of having "borrowed," the suggestion from Dr. Monro, or any one else. As to Dr. Physick's having taught it in his lectures, we all know, that he is so fond of any thing he thinks his own invention, that out it comes to the world, without taking time to consider or refer to others. And moreover, he has extended the same spirit to "Syng" Dr. Dorsey; to the no less injury of the claims of others for invention. As proof, he announced to his class, that Dr. Dorsey was the first to cut the eye lids in cases of the inversion of the cælia. But without trusting to recollection, I will insert Dr. Dorsey's own words. Before I do this, in order to form a proper estimate of the merits of the representation, I will insert the following from Heister's Surgery, vol. 1, page 370; adding this re-

remarkable circumstance, that Dr. Miller, the librarian, in looking over the book, found within ten pages of the part, a note in the hand writing of Dr. Dorsey, as shewn and stated to several.

"But if all the hairs of the eye lids are thus inverted, and the patient will not permit them to be extracted by the roots, there then remains but one method of removing the disorder by amputating the cartilaginous margins of the eye lids themselves, which the patient had better submit to, notwithstanding the deformity it may occasion, rather than be blind.

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From Dr. Dorsey's Surgery, page 294.

"In reflecting on the nature of the complaint several years ago, I was induced to think that the eye-lid could very readily be cut off, without much inconvenience, because the orbicularis muscle is capable of contracting in such a degree as to throw the folds of the skin into numerous wrinkles, thereby demonstrating that much of it could be removed and the eye still be closed. In a case in the alms house," he adds, "I made an incision through the tarsus, and cut out completely all that portion of the eye lid from which the film proceeded. My patient in a few days was perfectly cured, was extremely pleased with the operation and very little disfigured. Encouraged by the success of this case, I have twice since performed the operation of removing totally the lower half of the tarsus cartilage, together with the skin covering it, and the inverted cælia. The success has been complete in both cases, the wound healed up very readily; the inflammation quickly subsided, and the opacity of the cornea was soon removed."

By one of those coincidents which are often occuring, the late Mr. Saunders of London, contrived and performed the same operation with equal success. A small volume on the diseases of the eyes, which, for the first time, I saw during the present winter, though it was published in 1811, contains an account of this operation.

Note.—The operation is, I believe, new, though Haller in his Bibliothica Chirurgica, states that Rhazes recommended cutting and burning the eye lid in similar cases; the nature of his operations I cannot ascertain, as the only copy of Rhazes which I have been able to see, contains nothing on the subject. It is a black letter edition, very ancient, in barbarous Latin, belonging to the Loganian library.

I have made the above digression from the subject of the catheter, in order to shew the inattention of Dr. Physick and Dr. Dorsey to the rights of others.

Nothing can be more certain, than that Dr. Dorsey conceived himself the discoverer of the improvement, and of course that he had forgotten that he had read of it. He was a gentleman of such honourable and amiable feelings, that nothing could have induced him to do intentionally, that which would have injured another.

Of the use of the Catheter.

In the operation of reducing herniæ, called taxis, the introduction of a tube up the rectum as far as possible, might render essential service. To the external part of this tube or catheter, a common large injecting syringe could be annexed. On extracting the piston, the air of the intestines would enter the syringe; the admission

of the external air would be prevented by applying a piece of bladder around it, so as to cover the surface of the anus. The extraction of the air would necessarily produce a collapse of the intestines, encreasing the cavity of the abdomen, and at the same time, the peristaltic motion of the bowels, by which motion the reduction is effected when it is done by the operation of nature.

In cases of colic, arising from the distension of the intestines by wind, no remedy appears more likely to afford relief. I have found it successful in my practice, and would strongly recommend it, wherever there are violent pains from the distension of the intestines proceeding from confined air. I recollect the case of a female, to whom was presribed the saline draught, taken according to the old practice, the acid after the alkali. The union of these in the stomach, produced such a discharge of gas, as to distend the stomach to a most painful degree in a few minutes, threatening the death of the patient. The introduction of a catheter, or flexible tube into the stomach, produced instantaneous relief

I would strongly recommend the introduction of the catheter and washing out of the stomach as a remedy for drunkenness which should always be resorted to: as not only certain to afford present relief, but as an effectual preventive of a repetition.

FROM THE MEDICAL REPOSITORY, 1807.

A LETTER *containing* REMARKS *concerning* GENERATION; *addressed to* Dr. MILLER, *by* THOMAS EWELL, M. D. *and one of the surgeons of the United States Navy. To which is added, the best plan for preventing excessive population.*

UNDER the impression that men of good sense possess sufficient liberality to look over the errors contained in the efforts of those who desire to make useful discoveries, I cannot long hesitate in offering for publication such observations as appear of the least consequence. Not now meaning to devote any time to telling the trite tales about epidemics, or to give fashionable descriptions of common fevers; subjects with which every one must surely become acquainted by his own observation; I shall venture something concerning a process which has excited much attention among the curious, and great interest among all mankind. It relates to generation.

It would be useless to extract from the common-place books on physiology, an abridgment of the various theories which have been promulgated to account for the suc-

cessful or fruitful connection between the two sexes. I shall only state, with an eminent French character, that I believe the little embryo is a kind of neutral substance, a tertium quid, formed by the union of the male and female seminal fluids. Be this correct or not, it will not affect what I am to offer.

That animals breathe after they are introduced into atmospheric air, and that they die if withheld from it, was early known. But it is only of late that chemists have ascertained, that it is through the medium of a substance contained in the air called oxygen, that life is supported. Hitherto it has been taught, that the presence of oxygen gas was only necessary for the existence of animals after they began to breathe; to me it appears indispensably necessary previous to respiration. After making several experiments, and after reflecting on the subject, I am convinced that the presence of pure, vital, or oxygen gas, is necessary to give the first animation to the embryo formed in the uterus; that it is only after this union with a little oxygen, that the embryo is enabled to receive more oxygen and nutrition from the mother; and that consequently coition will always be unfruitful unless it be done in pure air, so that some oxygen gas may be protruded before the penis into the uterus; for which purpose the termination of the penis seems properly adapted. The reasons leading to this will be briefly stated.

That the male semen, when emitted and exposed to the air, becomes fluid is well known. Its fluidity appears to arise from its union with oxygen gas, from the following experiments, which, with others that will be afterwards related, were accurately performed by a friend of mine at my instance, whose name, at his request, must be withheld. A large healthy young man, while in the warm bath, emitted a considerable quantity of

seed, which he retained in an inverted tumbler with the warm water that was prepared for the purpose. This seed, instead of growing fluid, actually became unusually mucilaginous and thick, and so long as retained in the water, showed no symptoms of a tendency to fluidity. A quantity of seed emitted by the same young man, at another time was divided, and one portion put in a small glass, containing oxygen, and the other in one containing common air; that with oxygen first dissolved. By chemical tests it was ascertained (though from the imperfection of the apparatus, not very accurately) that a quantity of the oxygen had been absorbed by the seed, for the gas had disappeared. From this then it appeared, that the male seed was capable of uniting to oxygen. The following experiments were then made, which show the agency of oxygen in fruitful copulation. As the adherance of the male to the female frog, is so remarkably strong, that in that state they may be freely handled without separating them, and as the rudiments of the tad-pole are contained in a kind of filament extricated from the female, on which the male deposits his seed, which vivifies them, as shown by the indefatigable and curious Spallanzani, these animals were selected for experimenting with. Two of them engaged in copulation, were taken, and held in vessels containing pure distilled water, one impregnated with azoic gas, another with carbonic acid gas, a third with atmospheric air, and a fourth with oxygen gas. In each of these, the frogs deposited their filament, which was carefully attended to for several days, when it was found that only the filaments in the vessels containing oxygen and atmospheric air had the least appearance of tad-pole.

The famous experiment of Spallanzani, from which we learn, that by collecting the seed of dogs in syringes, and injecting it into bitches, he could form puppies, ap-

pears no longer surprising. The exposure to atmospheric air, which favoured the absorption of oxygen, must render the seed more prolific. Perhaps the seed of some animals may be made, by exposure to oxygen gas, wonderfully fruitful.

Should the doctrine of genaration which is now very generally supported be correct, which is that the female is impregnated by the *absorption* of the male seed, the direct agency of oxygen will appear equally clear. By rendering the seed more fluid, the facility with which the absorption takes place must be increased by oxygen.

There are a few facts concerning the propagation of the human species, which tend to favour the idea concerning the presence of vital air supposed to be necessary. Most of the children are born before midnight, when no disease has disturbed the mother, as has been often noticed. The chances of successful copulation must naturally be greatest in the early part of the night, as the air of beds before morning is well known to become so foul as to extinguish burning tapers when introduced. The astonishing number of births to the south, among the negroes, appears to depend in a great measure upon their copulating in the day, exposed to the sun, on the sides of hills, where the air is uncommonly pure. Their superintendants or overseers generally cohabit with the negro women under similar circumstances, and with such success, that but few women of the farms fail having white children by them.

If the above doctrine be correct, there is no doubt but that one of the causes of the barrenness of some married people may be, their not taking proper pains to guard against the presence of impure airs. Possibly the fruitfulness of some may be increased by a connection in a tub of oxygen gas. If there be a situation in which

having children would be distressing in the extreme, a remedy or corrective for fruitful nature might be found by embracing only in vessels filled with carbonic acid or azotic gas. May not the failure in the prolific powers of some women arise in consequence of a diseased state of their secretions in the vagina, by which all the oxygen is absorbed before the union of the seed of the two? Would not a remedy be obtained by injections, which either alter the state of the secretory glands, or act as a new sheath to the parts, without uniting to the oxygen?

This is a subject curious, interesting, and, I really think, important. Much light is to be thrown upon it, before the physiologists can be satisfied. I hope others will attend to it, and treat it successfully. The investigation might be promoted if individuals would publish their experience. Many often tell of exploits less natural, less interesting, and less important.

ADDITIONAL.

New Theory of Generation, from Dr. Haighton.

"Amid the uncertainty which exists on the subject of generation, there seem to be some points very accurately ascertained. Thus, from the experiments of De Graaf on rabbits, we long since learned,

1. That the ovaries are the seat of conception. 2. That one or more of their vesicles become changed. 3. That the alteration consists in an enlargement of them,

together with a loss of transparency in their contained fluid, and a change of it to an opaque and reddish hue. 4. That the number of vesicles thus altered, corresponds with the number of fœtuses, and from the former are formed the true ovœ. 5. That these changed vesicles, at a certain period after they have received the stimulus of the male, discharge a substance, which, being laid hold of by the fimbriated extremity of the fallopian tube, and conveyed into the uterus, soon assumes a visible vascular form, and is called an ovum. 6. That these rudiments of the new animal, which, for a time, manifested no arrangement of parts, afterwards begin to elaborate and evolve the different organs of which the new animal is composed. To these facts we may add, that the calyx or capsule, which formed the parietes of the vesicles, thickens, by which the cavity is diminished. This cavity together with the opening through which the fœtal rudiments escaped, becomes obliterated, and from the parietes of the vesicles having acquired a yellowish hue, they are called corpora lutea. Such was pretty nearly the extent of our information respecting this mysterious function, when the celebrated Dr. Haighton some few years ago, engaged in an experimental investigation of the subject, and established, among others, the following additional points.

1. That the existence of the corpora lutea, as was previously alledged by De Graaf, is incontestible proof of impregnation having preceded.

2. That contrary to the opinions of most physiologists, neither the vesicle of the ovary is ruptured, nor the fallopian tube applied to the ovaries during the act of coition; but, that several days elapse before the vesicle arrives at sufficient maturity to discharge its contents, till which time, the fallopian tube does not change its ordinary position.

3. That in contradiction to the observation of De Graaf, Malpighi and Cruikshank, the substance which passes from the ovary is a gletanous fluid, which assumes nothing of the circumscribed vesicular character of the ovum till a considerable period after it is deposited in the uterus.

4. That the semen masculinum is applied to the ovary neither by the fallopian tubes, nor by absorption, nor in the form of aura seminalis.

He concludes, therefore, that fecundation is performed by that "law of the animal system termed sympathy, or consent of parts." The doctrine is thus stated:

The semen first stimulates the vagina, os uteri, cavity of the uterus, or all of them.

By sympathy, the ovarien vesicles enlarge, project and burst.

By sympathy, the tubes incline to the ovaries, and having embraced them, convey the rudiments of the fœtus to the uterus.

By sympathy, the uterus makes the necessary preparations for perfecting the formation and growth of the fœtus; and finally,

By sympathy the breasts furnish milk for its support after birth."

The above abstract of Dr. Haighton's theory, condensed by Dr. Chapman, I have no doubt is the true explanation of the theory of conception. Mr. Hunter has shewn very satisfactorily that the seed of the male is not deposited in the vessels called vesiculæ seminalis; the seed remains in the testicle, which is roused to expel it, by its sympathy with the glans penis, where alone the irritation takes place which produces the ejection of the seed. In like manner the whole venerial action of the female takes place on the glans of the clitoris. It may readily be excited in them by the gentle titilation of the

clitoris, with the point of the finger, without the introduction of any body into the vagina.

This theory or explanation of the particulars of conception does not militate against the idea I advanced of the agency of vital air, in the process. The semen masculinum liquified by the vital air, becomes a more diffusible stimulus to the uterine system. The delicate tender construction of the parts, the red or florid appearance they exhibit during copulation, furnish strong evidence, that pure air is necessary for successful impregnation. This of course should lead women anxious to become pregnant, to remove from the vagina before copulation all mucus or any matter secreted there which might prevent the influence of the air on the parts. As far as my observations and inquiries have extended, experience proves that women do not conceive when the parts have much of any secretion in them. Another important means of relieving that barrenness which distresses so many women, will be found in another part of these observations.

These doctrines lead to most important results. They open the way to prevent that overflowing population which is the curse of so many countries. Lest this idea might be mistaken, I will insert a review of the work on population, of T. R. Malthus, A. M. of England, taken from the 10th volume of the Medical Repository.

"The fundamental position in this laborious and learned investigation is, that the procreative power far surpasses the means of procuring subsistence. The propagation of the species, if unchecked, would progress in a geometrical ratio, while the supplies of food cannot be made to advance faster than an arithmetical proportion. Their numbers have a tendency to double themselves once in 25 years, thus: 1, 2, 4, 8, 16, 32, 64, 128, 256; but subsistence can be provided only as 1, 2, 3, 4, 5, 6, 7, 8, 9; so that in two centuries the population would

be to the means of support as 256 to 9, and in three centuries, as 4096 to 13; and so forth.

"It hence follows, that the multiplicative power is always striving to extend beyond its proper limits; while the want of aliment imperiously represses and restrains it. And in the conflict which takes place between the increased numbers of human beings, and the difficulty or impossibility of procuring for themselves the necessaries of life, there is a check or limitation to further augmentation. In thus adjusting this extreme limit of population, a vast amount of crimes and wretchedness is experienced; for, in order to reach the maximum of numbers, it is necessary for each individual to descend to the minimum of subsistence.

"Mr. M. proves by inductions of facts from the history of savage people in America, the South Sea islands, and Africa, from the Scandinavian nations of Europe, and the pastoral tribes of Asia, from the history of Siberia, Turkey, Hindostan, Thibet, China, Japan, Greece and Italy; and from the condition of modern Norway, Sweden, Russia, Switzerland, France, England, Scotland, Ireland, and other countries; 1. That population is necessarily limited by the means of subsistence: 2. That it invariably increases when the means of subsistence increases, unless prevented by some very powerful and obvious checks; and, 3. That these checks, and the checks which repress the superior power of population, and keep its effects on a level with the means of subsistence, are resolvable into moral restraint, vice, and misery.

"The procreative power is so much greater than the capacity of the earth and sea to afford food, that unless it is arrested by celibacy, or some other preventive check, premature death must in some shape or other, visit the human race. The vices of mankind are active and able ministers of depopulation. They are the precursors in

the great army of destruction, and often finish the dreadful work themselves, as in the cases of war, ardent spirits, and venereal poison. But should they fail in this work of extermination, sickly seasons, epidemics, pestilence and plague, advance, in terrific array, and sweep off their thousands and tens of thousands. Should success be still incomplete, gigantic inevitable famine stalks in the rear, and, with one mighty blow, levels the population with the food of the world.

"In considering the different systems which have been proposed to lessen the enormous evils resulting from the too great multiplication of human beings, Mr. M. reviews the equalizing projects of Condorcet, Paine and Godwin, and proves their total unfitness for the purposes of society and the nature of man. He demonstrates the fundamental error of the poor-laws of England, in their tendency to increase population without increasing the means for its support; encouraging marriages, and then encouraging the new family to rely, in pressing exigencies, upon the parish for support, and not upon their own exertions. He compares the agricultural and commercial systems of political economy, and inclines decidedly to the former.

"He proves that the surplusage of inhabitants, or that part which is redundant, superfluous and hanging upon society as a cumbrous and oppressive burthen, will prematurely perish, by war, famine, pestilence, small-pox, or other destructive causes, which serve as the waste-gates of population; or will be cut off by crimes, vices and intemperance, which reduce its luxuriant overgrowth, and trim it down to a moderate size and compass. Whenever, therefore, the numbers exceed the quantity of food necessary to support them, the supernumeraries must perish by an inevitable law of nature. And he questions whether the extirpation of small-pox by cow-pox, should

that ever take place, would do any good; for if marriages between the indigent members of the community should be consummated at the usual rate, the same number must die, and instead of being destroyed by that disease, they would merely be carried off by some other exterminating agents. On this ground he doubts whether the average population of the earth has been diminished an unit by all the ravages of small-pox and plague.

"His grand remedy for the exuberant ills resulting from the excess of the propagating above the feeding powers of man, is that kind of moral restraint which produces virtuous celibacy, discourages early marriages, and withholds every person from entering into the connubial state, until there be the actual means or a reasonable prospect of supporting the probable offspring. The work, which is a sequel to those of the political economists, Stewart, Smith and Hume, is full of new and old views, and is worthy of most attentive perusal, by all who take an interest in the production, enjoyments, sufferings and disappearance of the human race. It exposes the error of foundling hospitals, poor-rates, and a considerable number of what are called charitable and benevolent establishments, in very strong terms."

The difficulties imposed by most countries for the consummation of marriage, no doubt have originated from a spirit to prevent too great population. But what can laws do with men, having their passions for the sex excited, when we know from almost daily experience, that with a certainty of being executed before their eyes; they will rush on and cohabit with women, in defiance of all resistance. What law can be made to affect women, who in order to have sexual intercourse with the objects of their love, will abandon, nay, be happy in the sacrifice of every comfort and honour they previously enjoyed. The remedy for these violent feelings or excitements, is to be found

in mild treatment, not in castration, in hanging and whipping. The sexes will connect as every one of observation must admit; and the best mode of their doing it, is according to the usages of their neighbours, under the unopposed marriage contract. If they cannot maintain children; if their children are to be brought up in every scene of temptation, to villany, it is best not to have these children. To prevent their conception, by preventing copulation, is out of the question, and never entered into the head of any man of actual observation. But after the act of coition, it is very easy to prevent the conception. The venereal convulsive delirium is over before the expulsion of the male semen; and no doubt the excitement in like manner is over in the female, before the action of *creation* commences in the ovariæ. The sympathy between the clitoris, the seat of pleasure, and the part which makes the child may easily be destroyed before the action is commenced in it. The influence of the air and the seed might be effectually prevented by the introduction into the vagina of some soft, mild body, as a paste of common meal before the connection.

Of the prevention of the sympathy of the ovariæ so as to prevent conception, there can be no doubt. A loose woman of a very lecherous nature, has within my knowledge, prevented herself from conceiving by this plan. The moment after copulation she rose and set in ice cold water, injecting it up the vagina, with the invariable effect of *preventing*, not destroying the product of successful copulation. To my remark that it was a crime against the laws of creation, she urged, that she sinned no more than those who refused the pleasure of the connection, which created the child; and not as much as the many women, even of high standing, who danced and did many things in hopes of creating abortion. In those cases where it is felt as a misfortune not to have children, I

would advise the immediate prevention of the sympathy of the parts, by adding to the very cold water to be injected in the vagina, a solution of sugar of lead or white vitriol, brandy, or any other active article.

This information is communicated to medical men; whether or not it should be extended to all mankind, I am unable to decide. Let the philosophers consider and determine if it will lead to prostitution or not. Viewing it in the light I do, I should pronounce, that as there is a native feeling of virtue in almost every person's breast, so we may infer that connection under marriage, without the danger of entailing misery on others, would tend to prevent clandestine intercourse. Although no good man, commanding his feelings, would counteract nature in any way, yet I should prefer the first to the second means; as it is a truth not to be disguised, that in order to prevent the disgrace of exposure, thousands of children in the womb are annually murdered, and often with the additional calamity, of destruction to mothers, by the means resorted to for producing abortion.

AN

INAUGURAL ESSAY,

&c.

ADVERTISEMENT.

THE following remarks, entitled "Notes on the Stomach and Secretion," were written by me in the year 1804, and published as an Inaugural Essay, in May, 1805. It has been many years since I have seen them, but I have ever since their publication felt satisfied with the correctness of the doctrines advanced in them. They were printed with a preface, stating,

"In daring to deviate from the beaten track, in the following pages, I was regulated by a regard for truth. The opinions were formed from facts which occasionally occurred during my studies. The brief support which they receive may be one of the many glaring errors which the more experienced reader may discover. At least this was unavoidable, as under present circumstances, I could not print on a more extensive scale. There is, however, a consolation in the fact, that should there be new truths, strong minds will discern them, although but an obscure glimmering shew the way.

It was deemed unnecessary to add more frequently the names of the authors of opinions. Those who have read with attention will readily perceive where I am indebted to others. Nor can such be surprised at the frequency of these debts. KNOWING THE IMPROVEMENTS OF MODERNS, ONE CANNOT FAIL SEEING, THAT TO BE A CORRECT ECLECTIC, IS ALMOST THE EXTENT OF OUR EXPECTATIONS.

AN

INAUGURAL ESSAY, *&c.*

PART I.

RELATIVE TO THE STOMACH.

"When life is interested, if we are permitted to form conjectures, it should be for the purpose of submitting them to the proof of experiment, which ought to decide." *Senac.*

HOWEVER great we notice the inquietude of the mind, we find no such principle extended to the body. The spirit of restlessness is not more striking in the one, than the disposition to accommodate to circumstances in the other. Of all the parts displaying this disposition, no one is more remarkable than the stomach. Being most intimately connected with the whole system, the exercise of its powers produces the most obvious and salutary effects.

The illustrious Abbe Spallanzani is among the first who observed the changes produced in the menstruum of the stomach by a particular regimen. He discovered that the gastric juice taken from herbivorous animals would not dissolve muscular matter; while that procured from carnivorous animals, produced no effect on vegetable substances. The instances showing this power of the stomach to adapt its solvent to the nature of substance acting on it

are numerous. I will add several which lately came under my notice.

On the sudden death of horses any one may convince himself by experiment, that their gastric liquor is incapable of acting on meat. In order to ascertain if the power could be acquired, I made the following experiment. An useless horse was confined without food about thirty-six hours; corn boiled in soup was then given him, which he readily eat. In two days this was changed for coarse meal wet with soup. The readiness with which he took this induced me to add small bits of boiled meat; and in two weeks he eat eighteen ounces of meat mixed with meal, at once, without hesitation. The experiment was then discontinued, when the only effects noticed, were an increase of the fœtor and fluidity of the fæces. There is no doubt but that by perseverance horses might digest flesh as well as other animals. Perhaps at some future period it may be deemed expedient to habituate some of them to an animal diet. Can their strength or can their velocity be increased by such a regimen?

A housekeeper assured me, that she raised a lamb in her kitchen principally on animal food. By degrees it became fond of boiled meat as well as milk. It grew to the common size, but was possessed of such unusual courage that it attacked a bull of the farm, and was killed in the conflict. The gastric liquor of this sheep dissolved flesh. In this respect it essentially differed from the rest of its kind; for, as I need scarcely mention, in no instance that I tried would their gastric liquor act on muscle, although boiled nearly to a jelly.

Cows, contrary to their habits, occasionally eat and digest animal food. A mixture in which meat has been boiled is frequently given them in Virginia, during the winter. I once saw one eating her after-birth, on the morning subsequent to her delivery; and am well assured that they

frequently do it. My friend, Mr. M'Call on hearing of this informed me that he saw one of his father's cows eat a considerable portion of bacon.

But of all stomachs that man appears to possess this accommodating principle in the most eminent degree. For as in the Laplander with his rein-deer, it enables him to receive a support entirely from animal matter; or as in some tribes of Asia and Africa, with their spices, entirely from vegetables; or as in the inhabitants of Orange river, from putrid seals and fishes. The manner by which such important changes in the gastric liquor are wrought, is but little known. Are they produced by the mechanical effects of the substances, whereby the state of the secretories become altered? And if the substances by their mechanical powers alter the condition of the vessels in the stomach, does it not follow that the variation in the qualities of the gastric liquor must be proportionate to the variation of substances? But this idea will be more clearly expressed in the sequel.

Independently of the dissolving powers of the gastric juice, it has many other properties claiming our attention; of these an antiseptic power is no considerable one. Doctors Stevens, Spallanzani, and Mr. Hunter, have proved that it not only prevents but corrects putrefaction. The following experiment affords an example of this, as well as a new argument in favour of the vitality of the coagulating lymph when united, or partially organized, as I shall hereafter say.

A coagulum of blood was divided in two portions, and placed into two cups, the first of which contained some of the gastric juice of a hog. They were then left in a room, the temperature of which was 80°. In two days symptoms of putrefaction were perceptible in the second, while the first remained unaltered. The gastric juice was then poured from the first into the second cup; the pu-

trefaction was stopped in two hours, and in ten the coagulum was entirely dissolved. About this time the putrefaction of the other seemed commencing; I then poured on it a quantity of gastric juice, which soon corrected the putrefaction, and dissolved the coagulum in eight hours.

Since the discovery of this property in the gastric liquor, surgeons have applied it to gangrenous parts with good effects. It has also been used for other purposes, which I shall briefly mention. The ingenious Doctors Darwin and Dorsey, speak of it as a lithontriptic, and the experiments of the latter favour the idea. Dr. Harness applied it to old scorbutic ulcers, with advantage. Jurine, of Geneva, found that it lessened the pain and irritation of foul ulcers, when applied to them as an anodyne. The callous edges of sores have also been removed by its use, when other applications failed. Mr. Home observes, that when applied to the surface of the body, its primary effect is to increase the irritation. Knowing this, we can readily understand how it hastens the effects of opium and most other medicines, when mixed with them and applied to the body. This is an important fact, and it is astonishing that the gastric juice is not more frequently used for such purposes.

In the fall of 1803 I read before the Philadelphia Medical Society, a paper on the properties of the gastric liquor. In this I suggested the idea, that it was a peculiarly powerful stimulus to the lacteals. Since then I have instituted the following experiments:

An opening was made in the abdomen of a large dog that had fasted for two days. The contents of the jejunum were pressed aside by the fingers, and two ligatures tied around it, which included about two feet of the intestine. Between these ligatures an orifice was made, and an ounce of the gastric juice of a hog injected. This orifice

was then closed, and the parts reinstated in the abdomen for three hours, when the dog was killed, and his intestines examined. The inflammation of the peritoneum was considerable, and particularly about the ligatures. On opening the intestine I found that three-fourths of the gastric juice had been absorbed, and that a mucus had been secreted in its cavity, thicker and in larger quantity than was natural.

In the next instance I procured equal quantities of the gastric juice of a hog, and of bile, and my own saliva. Each of these were injected into the smaller intestines of a dog, which had been divided into equal portions by four ligatures applied as above. The intestines were replaced in his abdomen, where they remained for three hours; the dog was then killed. I found that the inflammation was more considerable than in the former experiment; that the gastric juice was near half absorbed, the saliva about one-fourth, and the bile not in the least, but blended with considerable quantities of mucus.

I next attempted to ascertain how far the preparation of chyle depended on the gastric juice. For this purpose I saturated an ounce of this solvent with well boiled meat in a temperature of 110°. A dog that had starved for two days, was then opened, and two feet of his jejunum cleansed and secured as in the first instance; a puncture being made, this compound was injected in the gut, where it remained for three hours confined in the abdomen. The dog was then killed and examined. About one-third of the mixture was absorbed, and the mesenteric glands coming from the tied intestine contained a small quantity of chyle; there was also a small quantity in the thoracic duct, which as well as the former was more limpid than usual, being blended with the lymph of which the remaining glands were filled. These experiments inclined me to believe that good might re-

sult from the exhibition of the gastric juice in particular diseases. They also served to induce a friend of mine to make the following experiment, an account of which he gave me:

"Two puppies of the same litter were procured, and confined in a room. The first weighed two pounds, and the second two pounds five ounces. I injected in the rectum of the first, twice a day, a mixture composed of two ounces of gastric juice (procured by sponges) and three ounces of a rich soup well sweetened; at the same time five ounces of the sweetened soup were injected in the other. This troublesome experiment was discontinued in ten days, when the dogs were weighed. The first only lost two ounces and three drachms, while the other lost four ounces and two drachms. Imperfect as is this experiment, it favours the idea, that some good would result by combining the gastric juice with nutritious substances for injections, when patients require enemata for a support."

During the convalescence from fever, when the atony of the intestines is great, and the secretion from the stomach vitiated, nothing appears so well calculated to restore the parts to health as their natural stimulus, a pure gastric liquor. Should patients refuse swallowing it, the beneficial effects might probably be derived by frequent injections. That species of diarrhœa proceeding from a torpor of the absorbents, it seems happily calculated to remove. The irritability of the stomach is occasionally so much increased, that it will retain nothing for many days. Professor Wistar, whose name I cannot mention without feeling the most lively sensations of respect and gratitude, is in the habit of relating to his class, such important cases as occur in his practice. Among these he mentioned an elderly lady, who laboured under a distressing vomiting for several weeks:

during this time her life was entirely preserved by injections, per anum. It is in cases like this, I presume, important effects would be derived by mixing with nutritious substances the gastric juice of healthy animals. Children, whose susceptibility to be acted on is particularly great, seem also the most proper objects to be benefitted by our remedy.

Feeling convinced of the virtues of this secretion, I became anxious to meet with cases in which it could be prescribed. Notwithstanding my wishes, however, only the following occurred.

A negro boy about three years old was brought to me by his mother, who said he was affected with worms. He had a slight diarrhœa, a tumid abdomen, and daily became debilitated. A few grains of calomel were given, which purged him, but brought away no worms. I then collected a considerable quantity of gastric juice from several hogs that were killed; its disagreeable odour was entirely removed by powdered charcoal. Three injections, of about four ounces each, of this sweetened, were given at first, and two doses, about an ounce each, were swallowed daily for ten days; on the fourth day, five worms of the lumbrici kind, were voided; and on the sixth three others. The strength of the boy increased with his appetite, and he was perfectly recovered in three weeks. Did the anthelmintic power proceed from the tone given the alimentary canal? Or, did the symptoms proceed from an affection of the mesenteric glands, and the recovery from their restoration? In either case, the remedy seems equally well adapted, as the application of a natural stimulus to the diseased mesentric glands, must tend to excite their natural action.

Since the above was written, I have found that Carminati, an Italian, and Jurine, of Geneva, have exhibited

the gastric juice in several cases. It was used successfully in cases of indigestion, vomiting of acid and black matter, and in intermittent fever. The approbation of such respectable authors affords an additional inducement to exhibit this secretion.

The difficulty of procuring the gastric liquor may prevent its introduction into general use; but if in a few cases it affords relief, it is entitled to a place in the Materia Medica. Such a preventative, however, cannot be urged against our using it in a manner and for a purpose I shall now propose.

It is well known that there are medicines (resins for example) which are soluble in the gastric juice, only when blended with gum or mucus. It is on this account, I presume, aloes will act only in the rectum, where it unites with the mucus of the gut. It must appear evident that most medicines do not act on the stomach before they are dissolved in its menstruum; nor can it be doubted that the effects of medicines must vary with their solvent. Hence, as the gastric juice is liable to the greatest changes, we frequently see the same medicines produce different effects on different persons. It is also on this account that I presume the same medicine produces different effects at different times on the same person; and that in some instances particular forms only of a medicine will operate. Doctor Rush, in speaking of clinical cases, observed, that an opium pill had sometimes checked vomiting when most other remedies had failed. And in the case of my mother, affected last fall with an incessant vomiting, I found that a watery solution, only of opium could afford relief. In some instances it has been found that very active medicines would prove either inert, or exert some uncommon power on the system. To lessen such occurrences I imagine it is only necessary to mix the doses

with a small quantity of the gastric juice of healthy carnivorous animals. This would be the more proper in dangerous cases where, at critical periods, a slight irregularity might prove destructive. The suggestion appears so plausible, that I cannot avoid wishing, that practitioners will at least ascertain if it deserves to be prosecuted.

Detail of the results of experiments concerning the liver.

IN the fall of 1804, I performed several experiments, which, perhaps, deserve to be mentioned. Minute details of them were drawn up, but as they are too lengthy, I will only state the results. They were instituted with a view to ascertain the effects produced by an accumulation of blood in the stomach.

By making a free incision into the abdomen of a dog, in an oblique course from the sternum to the spine of the right side, access could readily be obtained to the liver by a long needle. I performed this operation on several dogs; and around the vena portarum of some, tied a ligature tightly: in others the ligature was only drawn so as partially to compress this vein, while, in a few, it was applied around one of the lobes of the liver.

In the cases where the obstruction was greatest in the liver, death shortly followed, and the viscera appeared in that state denominated, suffocated excitement, by Dr. Rush. The blood suddenly acquired the dissolved appearance common in typhus, which is another proof, that it does not depend on putrefaction.

When the passage of blood from the viscera was partially impeded, the symptoms varied considerably. There was great sensibility and soreness of the stomach shewn by incessant vomiting and sighing. This was proportionate to the obstruction in the liver: and hence Hippocrates, in his seventh prorrhetic, remarks, that

this indicates the degree of danger in malignant fever. There was a dark mucilaginous matter vomited up, which was evidently secreted in the stomach. This corroborates the opinion suggested by Dr. Stewart, but demonstrated by Dr. Physick, that the stomach in yellow fever is the source from which this water is derived. A dysentery and cholera came on in some instances, and the evacuations were so considerable as to produce in a short time a remarkable degree of emaciation. Mr. Mathews, and Doctors Girdlestone and Saunders, have mentioned similar effects which occurred in hepatic affections, and it is probable, that in epidemics where these symptoms take place, they proceed from a similar cause. Unless the passage of blood from the part, be impeded, it is difficult to conceive how such large quantities of fluid could be secreted in so short a time.

In some instances there was delirium, and in others a disposition to coma. This together with the frequency of hepatic affections in mania, led me to conclude, that diseases of the brain might originate from the liver. As the irritability of parts is generally proportionate to the quantity of blood in them, the irritability of the stomach must be increased when the blood is accumulated in it, in consequence of hepatic obstructions. The ordinary stimuli then acting would produce diseased action, which, being communicated to the brain by sympathy, constitutes the disease. It must, however, be observed, that the symptoms following affections of the liver, like those of the brain, are not always proportionate to the apparent injury. In the New York Medical Repository, I published an account of a lunatic, whose disease evidently arose from sympathy with the stomach. Since then my opinion has been strengthened by the concurrence of the learned Dr. Pascalis of this city.

Note.—The case above alluded to, is the case of lunacy published in the commencement of this work.

ADDITIONAL.

Doctor Parish of Philadelphia, stated to me some days ago, that he had met with two cases of black vomiting, arising from local injury to the liver. In one case the patient died, and his liver was found fractured; in the other, the patient recovered. There can be no doubt from the above experiments, and these cases, that the black vomit and most of the affections of the stomach attendant upon malignant fever, originates from partial obstructions in the vessels of the liver, transmitting the blood of the chilopoctic viscera. Hence our remedies should be directed with a view to relieve the obstructed liver in many more instances than are generally recommended.

PART II.

RELATIVE TO SECRETION.

"False principles in medicine have slain their thousands and tens of thousands. The great evil consists in the servile adherence to one particular system." B. RUSH.

WHEN we contemplate the animal machine, we are struck with the extreme vascularity of all its parts. This is so general and considerable, that the human body has been emphatically called a "collection of capillaries." In these tubes or vessels, the most important operations are performed. It is in these that the blood is so wonderfully modified, as to be adapted to all the exigences of the system. The most general operation we notice, is the conversion of arterial into venous blood. No part is exempt from this remarkable process, whereby the properties of blood become so materially altered. While we keep in view the uniformity and the simplicity of the operations of nature, we will account for this phenomenon on common principles.

It is an undoubted fact, that the form and properties of most substances are variable, depending considerably on the circumstances in which they are placed. By experience and observation, we learn what changes can be produced, and what is necessary to produce them. For example: of water, we find that in a low degree of heat

the particles cease to roll on each other, and become so arranged as to constitute ice. In a higher degree, another substance, the egg is deprived of its fluidity, while the solidity of a metal is lost in the same temperature.

In accounting for the these phenomena, we do not call in the agency of an intelligent *vis vitæ*, or uncommon principle: neither can they be referred to one of the agents separately. All agree in referring them, to the natural tendencies or affinities of the substances, exercised in consequence of the circumstances created by lessening or augmenting the heat. No objections can be urged against extending this method of philosophising the method of induction, as proposed by Lord Bacon, to the human body. Let us then mention the facts, and make the inductions as in the above instances.

But little experience is necessary to teach us that the arterial blood, like most substances, is susceptible of the greatest changes, and that these can be varied with the circumstances in which it is placed. For example; in the arteries we see it is of a vermilion colour: but as Sir Isaac Newton long since observed, in a particular position, it will reflect the yellow rays of light. We see also, that it readily loses its fluidity in a temperature of 160° or when permitted to rest. In the last instance, the coagulating lymph unites, and becomes solid. This tendency of the lymph is also seen in the granulations of wounds, which, being covered with it, readily unite together. The coagulum formed by the union of the lymph, possesses some of the characteristics of life. These are, I presume, acquired in consequence of the union or partial organization of the lymph, effected by the attraction of cohesion. Hence such causes as to destroy the aptitude of the blood to appear vital must act so as to prevent the tendency of the lymph to combination. Hence in inflamed parts, where there is a considerable quanti-

ty of blood, there must be an increased deposition of organized coagulating lymph, and consequently often a painful increase of irritability and sensibility. This, however, does not take place when the deposition is in the cellular membrane, as in schirrus tumours. But to return from this digression. When the blood is propelled to the small capillary vessels, in consequence of fibrous action (which is the only effect of it we perceive) the circumstances necessary for its continuance in the state of arterial blood no longer exist. On arriving at the commencement of the veins, it takes on the properties peculiar to it in that state of parts, and is thus converted into venous blood. Here we see the agents, the solids of the part, and the blood, as in the former instances. As the solids remain unaltered, the effects we should refer to the natural affinities of the blood in the parts, just as we do the various shapes of water, eggs, and all other substances.

If the above be correct, we are led to look upon the body as a laboratory in which the most important operations are performed. From the differences in its construction, we naturally conclude that various compounds are formed; accordingly we find that different processes go on, and that fluids different from venous, are separated from arterial blood. These are the secretions familiar to us all.

Physiologists in accounting for the secretions since the rejection of the explanation on principles of mechanical filtration, as proposed by Baron Haller, have referred them to changes wrought by the actions of the secreting vessels. The only effect of the action of a gland or vessel, that we can perceive, is to propel the blood through it; and indeed it is to me incomprehensible, how the motions of simple tubes or vessels could produce changes in any fluid. I shall therefore wave the consideration of

the supposition, and proceed to account for the phenomena on the simple principles suggested above.

Although we are not able to detect the particulars in which one secretory vessel differs in its structure from another, yet on the slightest attention, we can perceive a very material difference. We can readily discover that the delicate hand of nature has made an astonishing modification of even the most minute vessels. From the various structure of all the glands, the blood, when propelled in them, assumes in each, in consequence of exercising the affinities peculiar to it in that state, the necessary form and properties. Mr. Home observes, that immediately on leaving the vessels, the secretions are fluid, and acquire their consistence shortly after, as is instanced in pus. When the new properties are thus acquired, the ducts convey them to the parts for which they were formed. It is thus, I presume, by the exercise of chemical laws, regulated by the mechanism of parts, that the successive supplies of all the secretions, are created from the blood.

If this explanation be admitted, the vague conjectures of physiologists relative to secretion will be laid aside. In place of them, we will have the plain facts, that nature was accurate and wise, when she so made the solids of animals, that the fluids acquire in them, by their own tendencies, the necessary form and properties. Nor does she here demonstrate more forcibly, a delicacy and wisdom in operating, that in the structure of her masterpiece, THE EYE.

Our theory has something more than simplicity to render it plausible. It will enable us to explain several phenomena which have been noticed.

The analogy of all venous blood coming from glands secreting very different fluids, can no longer remain a mystery.

The formation of an oleaginous matter like spermaceti after death, in the body, and many other secretions, are common occurrences. Fourcroy, by a particular process, was enabled to form bile from the blood of an ox, which has been erroneously supposed a proof of its being in a formed state in the blood. It must readily appear from the invariable tendencies of matter, that whether the necessary circumstances for the formation of a substance exist in the body before or after death, or elsewhere are created by art, that such a substance would be necessarily created, when the component parts are present. Hence this leads us to expect, that from the progress of knowledge, all the secretions will, at some future day, be formed by art.

There is a system of vessels whose office to the body seems the reverse of that of the secretories. This is the absorbent or supporting system, formed by the lymphatics and lacteals. While the one is engaged in diminishing the volume, the other is no less industrious in renovating our blood. It is through the medium of these vessels that chyle is formed from our food, sometimes even after death, and that the secretions of our body, tumours, pus, extravasated blood, &c. are returned to the sanguiferous system. In these processes we find nature adhering to her beautiful simplicity. By a proper and similar formation of these vessels, all this variety of substances, on entering in them, assume the same appearances in consequence of their natural affinities in that state, just as they acquired other properties under different circumstances in other parts. When these new properties, the properties of lymph are thus acquired, it is conveyed to the blood-vessels, and according to the ingenious Doctor Hutchinson, the blood exerts a power in the assimilation. Being under the same circumstances, and having the same constituent parts, it must readily

appear how the same form, &c. is immediately acquired on entering of the lymphatics. It is in this manner that in continued fevers, where no nourishment is taken for weeks, the large quantities of blood, I presume, are formed from the secretions, the absorption of which must be accelerated during the general increase of fibrous action. This is confirmed by the circumstance that the animals in the north during their topor are entirely supported by the absorption of fat, a secretion, deposited in their cellular membrane.

There is a fact, familiar to most of us, that tends to prove the correctness of these opinions. This is the support which one animal receives from the secretions of another. It is true that some of these are more nutritious than others. This must proceed from stronger attractions resisting the lesser tendency to assume the form necessary for nourishment. Although when the secretions are submitted to degrees of heat, different results are obtained, yet it is no proof that the primary parts are not nearly the same. This cannot be questioned when we attend to the great power of heat to cause different combinations. We have an example in the experiments of Mr. Abernethy, who, by subjecting vegetables that grew in perfectly pure water and air to the action of fire, obtained a quantity of iron from them. The secretions having a tendency to spontaneous separation, afford a most generous support, and fat and milk are among the most remarkable. When these are eaten, they are conveyed to the lacteals, and, after taking on the properties of chyle in them, pass on to the blood, and assume its properties. Here we have almost to demonstration the same particles in the shapes of a secretion, chyle, then blood, in which last it originally was.

The laboratory of which we have been speaking is liable to the greatest revolutions from a variety of causes.

The mechanism of every part may be deranged; the ordinary actions and processes be suspended; and new operations take place. These being deviations from health, according to the sagacious Gaubius, constitute disease.

The causes of the derangement of the animal solids, or containing parts, are innumerable; most incitants, under particular circumstances, may affect, in some manner, the yielding capillaries, so as to produce disease. In some of these affections of the solids, very uncommon combinations take place in the fluids, which are termed, "morbid secretion." The causes producing this, I presume, act entirely mechanically on the minute vessels, altering the ordinary states, and creating others peculiar to them. It is in this way, for example, I suppose that vegetable and animal substances cause a difference in the secretion of the stomach, while hepatic obstructions which cause the black vomit, &c. create a still greater difference. Also, when the morbid poisons are applied, they appear to act in a similar way, producing a capacity peculiar to them in the solids, when the neighbouring fluids enter and assume the properties peculiar to that state of parts. This leads us to reject the great Mr. Hunter's supposition, "that the animal fibre has the power to produce, by a particular action, a substance peculiar to the irritant applied;" and Mr. Moore's idea, that there is any thing like fermentation excited in the blood in such instances.

From the manner we have considered this subject, the propriety of directing our remedies for disease, to the solids, will at once be obvious. It will appear still more proper when we recollect that such is the nature of the capillary vessels, that when diseased states are produced in them, changes wrought by depletion, mercury, &c.

have the effect of removing them, and leaving active the tendency to return to the healthy state.

In a few instances, where certain states of our solids occur, they can be obviated only by extirpation. We have an example in cancer, where the morbid matter is continually formed. However, it is not probable that this imperfection in our art will long continue. Will the application of syphilitic matter, by producing the state peculiar to itself, alter this cancerous condition of the vessels?

An idea of the great mutability of our solids may be formed from the following specimens, recorded by authors on morbid secretion. M. Chaptall tells us of a man, who in a convalescence from fever, on washing his hands, found that ammonia was thrown off. Bertholet assures us, that he had known the phosphoric acid to be perspired. Doctor Rush, in an epidemic, saw a woman's milk of a green colour. The carbonate of lime is said to be frequently secreted in parts affected with arthritis. In such affections Doctor Wallasten has proved that pure lithat of soda is sometimes formed. Sir J. Pringle obtained a cancerous looking matter from the intestines which he supposed was secreted in dysentery. Doctor M'Lurg found an insipid fluid in the gall bladder. Doctor Weems, who is an accurate observer of nature, saw a matter analogous to green vitriol in solution vomited up in several cases, which he supposed was secreted in the stomach. And in all the stinking sores of our bodies, we have remarkable instances of morbid secretion. Perhaps at some future period, when the characteristics of each morbid affection are correctly known, they may be designated by the substances newly formed. A nomenclature founded on such principles, would require ages of minute attention for its perfection. It would require a refinement in our observations, to ascertain

precisely the precursors, concomitants, and characteristics of a cancerous, urinary, or syphilitic state of parts on the surface of the body.

When the natural capacity or condition of our solids is deranged, it is not always that compounds foreign to the body are formed in them. From the influence of sympathy or consent of parts, the secretions of other glands are occasionally created in them. Such instances Doctor Rush has termed, "translation of action." It will be of some consequence to be aware of the fact, that there must be a translation of state as well as action in such cases. When the state is created, the blood, on entrance, will as necessarily assume the properties peculiar to it in that condition, in one part of the body as well as in another.

There are many remarkable instances on record of one part's performing the function of another. Among these we frequently hear of women's menstruating by the stomach. Doctor Senter published an account of a girl who voided urine by the stomach for a considerable time. Doctor Heberden met with one who made no urine for two years. In this time her perspiration was profuse, and of a urinous smell. After death she was dissected, and no vestige whatever of her kidnies remained. In the late edition of Haller's Physiology, mention in a note is made of a woman who voided no urine for three weeks. Her perspiration was so profuse and disagreeably urinous, that not even her husband would approach her. After death one kidney was found completely suppurated, and the other reduced to half the usual size. An account is also given of a man who secreted milk in his groin. The illustrious philosopher and president of the union, Mr. Jefferson, attributes the peculiar odour of the negro, to the lessened action of the kidnies, and consequently increased perspiration.

This suggestion is strengthened by the fact, that they are not subject to calculous affections, which, as Dr. Rush observes, proceed from the kidnies.

The consideration of the above facts had led me to apply the principle to the explanation of a phenomenon which frequently occurs in warm countries. This is the bilious yellow tinge, characterizing the malignant or yellow fever. There is a considerable difference in the manner of accounting for this symptom by most authors. Some have referred it to a putrefaction of the blood; while others suppose a different kind of modification to take place in it or in the serum. The Baron Humboldt informed Dr. Rush, that it proceeded from an incipient combustion, which he inferred from the yellowness preceding the burning of paper. But these conjectures cannot be admitted, as it is an undoubted fact, supported by the most respectable authorities, that the colouring matter is common bile.

The gentlemen, in accounting for the diffusion of bile over the system, which they all suppose secreted in the liver, have not coincided in opinion. Some have attributed it to regurgitation, others to absorption from the liver, or from the intestines; while a few refer it to a retrograde motion of the absorbents. But granting that the bile is formed in the liver, it does not appear that the absorbents are the medium through which it is conveyed to other parts. The most powerful stimulants to the lymphatics tend to lessen and remove this yellowness. We have a case related by Jackson, where the yellowness was suddenly removed in consequence of applying a large blister to the hepatic region. This affords an argument in favour of the opinion advanced elsewhere, that such is the structure of the lymphatics, from the sameness of the constituent parts of the secretions, they all assume in them the properties of lymph.

Independently of this, from our knowledge of the terminations of the absorbents, it must appear, that were they to introduce the bile, it would be conspicuous in one part as soon as in another. This is not the case, as in most of the works on malignant fever, mention is made of the partial yellow appearances, which precede the general. The feet became first tinged in the cases attended to by M'Clean, whilst Doctors Blane and Rush found it first about the neck, breasts, shoulders, &c.—Again; the yellowness comes on sometimes suddenly. Now the liver, however industrious it be, could not secrete such large quantities of bile as in a short time often deluges the whole system. But in such cases the liver has generally been incapable of secreting bile. It has been in most cases either enlarged or deranged in structure and secretion. In confirmation of this, we must refer to the dissections in the works of Pringle, Physick, Poissonier, and many other accurate observers.

After weighing the above facts repeatedly in my mind, I have no hesitation in observing, that the bile colouring the body in malignant fever is formed in parts remote from the liver. This opinion, however novel it may appear, is supported by several concurring circumstances.

When the action of the blood-vessels is increased to a violent degree, and the liver in consequence of its venous structure and particular confined situation becomes affected, the passage of blood through it must be impeded. The blood must then accumulate in the viscera, and create the engorgement noticed first by the French, and since by Doctor Clarke and others; be abstracted from the surface of the body, and cause the vomit, dysentery, cholera morbus, &c. In the diseased state of the liver, and debility on the surface of the body, the vessels of the latter acquire the biliary state, and I presume, the blood, on entering, is converted into bile in the parts. This is

corroborated by the fact, that there is a considerable connection between the liver and skin, even when the vessels of the latter retain their usual vigour. We have an example of this in the gutta rosea, to which drunkards affected with chronic hepatitis are so liable, (see Zoonomia.) We should be aware, not only of the natural consent of parts, of its increase, in consequence of the abstraction of blood from the surface, but also of the connection between the stomach and skin. For on the commencement of the disease, the bile is, no doubt, secreted in unusual quantities, and conveyed to the stomach and intestines. Here it may produce the state in which bile is formed in the vessels, and communicate it to the surface.* A fact related by the great medical historian, Doctor Cullen, strengthens this idea. Shortly after a patient eat a quantity of putrid meat, large purple spots appeared on the skin. An emetic, the doctor observes, caused the evacuation of the contents of the stomach, and the discolouration of the skin immediately disappeared. It should also be recollected that the arteries generally correspond in state to those of the primæ viæ. For example, in gastritis, we have a contracted radial artery, while in inflammation of the colon it is much larger.

It appears no less evident that the bile, that has been proven to be the colouring matter in jaundice, is not formed in the liver. Many authors have observed, that the yellowness, in some cases, was only partial in the commencement. Morgagni frequently mentions these partial bilious tinges; and Doctor Stark relates the case of one who had this symptom first about the pit of the

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* Doctor M'Lurg mentions the case of a man who always became yellow after taking an emetic, which of course caused the bile to enter the stomach.

stomach. Mr. Underwood observes, in a note annexed to his treatise on the diseases of children, that pregnant mothers dying of jaundice had not their fœtus' in the least coloured with bile, as shewn by frequent dissections. Moreover, dissections have shewn that in most icteric patients the liver must have been incapable of secreting bile. Its morbid condition is also shewn by colic, and other intestinal affections, which Van Swieten, Hoffman, and other old writers have observed to precede icterus. That the surface of the body is the part in which the bile is formed, appears probable from the itching of the skin observed by Doctors Jackson, Stark, and Rush.

There is a case related by Pringle, tending to prove that bile may be formed in parts remote from the liver. A poor soldier had, for several weeks, a large tumour in his right side and could not lay extended. He was distressed by an incessant inclination to vomit, with an uncommon pain and sickness at stomach. Two days before his death Sir John observes, that he became suddenly suffused with bile. After death the abdomen was opened, and to the surprise of the spectators, the whole of the liver was found completely schirrous and purulent. M. Beaumé also gives an account of a similar case. A child was suddenly affected with jaundice, and died. On dissection it was observed, that the whole interior part of the liver had suppurated.

That the biliary state said to take place on the surface of the body is not more foreign to the nature of the part than others which have been noticed, will readily appear from the facts formerly adduced, as well as the following. How far these depend on affections of particular viscera, and the sympathy between them and the surface, cannot now be determined.

The yellowness is said by many authors to differ in degree. Although this may depend much on the quan-

tity, yet no doubt the quality of the bile has considerable influence. Hippocrates, in his second book on the epidemic of Cranton, observes, that biles and eruptions on the skin were frequent; and were attended with great heat and itching. Pustules also arose analogous to burns, and were affected with a similar sensation. Goodwin, in his historical account, notices a species of the plague, attended with an eruption, like the measles, all over the body. In two or three days they vesicated, dried away about the fifth, when death shortly followed. Sydenham, in his "Schedula Monitoria," enumerates a military eruption, as one of the symptoms of a favourable tendency. Doctor Russel, in his history of the epidemic of Aleppo, remarks, that the petechiæ were common, and of different colours. The variegated colours were a pale faint blue and dark red, being at different times more or less obscure. A marbled appearance of the skin was slso visible in different parts; and such was the violence of the disease, that these colours vanished and returned at short intervals Doctor Lind noticed, that in the East Indies a great itching of the legs frequently took place. Doctor Home, in his account of the yellow fever of Jamaica, mentions, that pimples were common about the pit of the stomach. Doctor Barton informed his class, that they were common over the whole body during the epidemic of '97 in Philadelphia. Doctor Rush observes, that in '94, falling off of the hairs, peeling off and great insensibility of the skin took place in some instances. The Doctor also observed, in other cases, a painful increase of sensibility, eruptions, roughness, and great itching of the skin. He met with some patients where the redness of the surface predominated, so as to produce the appearance of inflammation. In one instance the perspiration was so much altered, that it turned the sheets of a yellow colour for several weeks. Ulcers of a

most alarming nature and destructive tendency, frequently appear during these violent fevers. I will pass over the buboes, carbuncles, &c. which have been frequently noticed. In Clifton's translation of Thucydides' Treatise on the Plague, ulcers on the toes, fingers, privates, &c. are said to have occurred. Doctor Chisholm met with cases attended with ulceration of the scrotum at Boulam, as well as apthæ of a small white kind on the skin. My friend, Mr. J. Cooke, informed me, that in the late epidemic of Loudon, eruptions, ulcers, &c. frequently appeared in various parts of the body. But of all the symptoms indicating derangement on the surface of the body in malignant fever, none are so remarkable as that recorded by Moseley, M'Clean, and most West India writers. This is the exudation of dissolved blood from almost every pore of the body. These cutaneous hæmorrhagies are attended with such an insupportable stench, that according to authors, few can approach the patients.

By the theories advanced, we are enabled to account for several phenomena which frequently occur. The yellowness, as has been observed, appears sometimes about the feet; being remote from the heart, their debility must be greater than parts more nearly situated. From the venous structure of the liver, it is inferred, that this to a certain extent favours the biliary state and action. To this debility and greater consent of parts the primary appearance of bile about the neck, breasts, &c. must be owing. The yellow colour produced by the venom of serpents is also said to proceed from bile, by some authors. This is probable from the powerfully stimulating nature of the poison, which, producing debility first at the parts bitten, favours the formation of bile about the wound, and gradually over the whole system. May not the yellowness following contusions originate in the same way?

After death from malignant fever, the yellowness suddenly appears over the body in many instances. My friend, Dr. Hartshorne, has frequently noticed this, and assured me that it proceeded from bile, which he, with others, supposed to transude after death. But I cannot adopt the opinion, however disposed to value the suggestions of such excellent and attentive students of nature. Independently of the observations delivered relative to the liver, above, there is no probability, that bile could transude through the body so rapidly. Since we see it retained for weeks in the gall bladder in the anatomical room. That state of solids necessary for the blood to take on the appearance of bile, may be created in the body just before death, or some time after. The blood on entrance would assume the properties peculiar to it in that state, just as it does when the parts are adapted for the formation of spermaceti or any other animal production that has been formed after death.

It has been observed, that the state of solids must be altered, and a new one created, before new substances are formed in them. Also, that in the violent cases of malignant fever, a morbid state of the small vessels towards the surface, adapted commonly for the formation of bile, was produced. To remove such dangerous states or capacities in the vessels, the most powerful remedies are requisite. Before the act of restoration to a healthy state can take place, an universal revolution must be wrought. With various views and success depletion, mercury, blistering, and the most powerful means have been used. Our view of this disease leads us to propose an additional method. This is a large air-pump, capable of receiving the body and extremities at once. By using this machine the pressure of the atmospheric air on the body might be so lessened as to produce the greatest effects. Might not the evacuation of a small quantity of

blood, drawn through the pores of the body by this instrument, supersede the necessity of copious phlebotomy? But in other respects the apparatus appears happily calculated to relieve. A determination of blood to the surface could be created with it, so as to cause an increase of sensibility. From the increase of sensibility on the skin, the cold so highly extolled by Jackson, and most of the incitantia, might be applied to the body with still greater revolutionary power. With this machine the tendencies to diseased states on the surface, could not only be prevented, but the engorgement of the viscera, producing black vomit, cholera, &c. could be removed. During the reign of the destructive epidemics which often desolate the warm countries, such a contrivance might be of incalculable utility. It could be applied by the people at pleasure, when medical aid was not at hand

In hepatic affections characterized by mania icterus, cholera, diarrhœa, or any disease of the abdominal viscera, such an apparatus probably could be applied with the happiest effects.*

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* See this subject more fully considered in the address to the Philadelphia Medical Society.

REMARKS

CONCERNING

ANIMAL LIFE,

AND

THE CAUSES OF DISEASE.

REMARKS &c.

"*The number of absurd theories should not therefore inspire us with an antipathy to the term; nor must a panic terror of them banish physicians from the sacred temple of philosophy. To be hurt with the imperfect, and puerile commencements of reasoning in physic, and to relinquish the hopes of a rational theory, is to be offended at the childish prattle of infancy, and to expect nothing better from a maturer age.*" M'LURG, 21.

IT is a subject of astonishment to view the different theories which have been advanced to explain the symptoms and phenomena of animal life in health, and disease. It has been variously represented by different sectarians in medicine, as the result exclusively of mechanical arrangement or formation of parts—of chemical principles—of association or connetion of parts with each other—of an intelligent spirit regulating the materials of the body and of external causes, or stimulants acting on the machine.

The last assigned doctrine of animal life succeeded the preceding; and has been so universally received, as to

give an immortal name to Dr. Brown, who first fully explained it, to the satisfaction of philosophers and physicians. It is due to justice, however, to state that the idea did not originate from the author of the celebrated Brunonian system. The following from Doctor M'Lurg's "Introduction" to his treatise on the Bile, published in London, 1770, is inserted with a view to give a better idea of the doctrine, and to shew the absurdity of supposing a "vis medicatrix naturæ," regulating the motions of the body, and to shew the prior claim of Doctor M'Lurg to the commencement of the explanation.

"It is certain that the animal motions could never have begun, and would cease immediately, unless they were supported by the influence of external physical causes: in the impregnated egg, is any activity ever discovered without the application of heat? The soul had slept forever, and the machine continued motionless, but for the action of this energy. We believe with the greatest reason, that the brain is the seat of the intelligent principle. But in those fœtuses which are nourished, and arrive at their full growth, without any brain, what shall we suppose to have been the source of motion and activity?

"We certainly discover marks of intelligence in every work of nature; and of these, the animal machine appears to be the most perfect and exquisite. The Supreme Author has directed it by fixed laws, and to refer these purposes to some inferior intelligence, resembles the superstition of those idolators, who adore in the sun, the source of all the beneficent changes in nature. Such notions are the offspring of ignorance; which leads us to derive from a Being of a superior kind, what

we cannot explain from the view of any material energy. And they tend to make that ignorance perpetual, by setting bounds to the progress of the mind in its enquiry after physical cures.

"It is in the contemplation of nature, struggling with the powers which have a tendency to destroy life, that the animists chiefly triumph. But the efforts of the economy to re-establish its order when disturbed, seem to depend rather on the constitution of the machine, than on any endeavours of the intelligent principle. For they do not vary with the condition of the intelligent principle in different animals, but with the state of the machine. And we certainly observe, that the vires medicatries naturiæ, are much more perfect in a *polypus* (whose share of intelligence we may believe is not very considerable) than they are in a man. Since, while they cure with some difficulty a small wound in the latter, they form, from each of the divided pieces of the other, a complete animal."

It will be useless for me to attempt to expose the absurdity of the first mentioned doctrines, pretended to be equal to the explanation of all the phenomena attendant upon life. Neither separately will be found sufficient to account for scarcely one symptom; and there are but few symptoms which can be accounted for without reference to each. The body would as speedily cease to exist, if it were deprived of mechanical arrangement of parts and of the principles of chemistry as of the external causes or incitants acting upon it; or of the connection or association of all its parts.

According to the views I have taken of the subject

published in 1805, as will appear from my Inaugurated Essay, life may be considered as depending on,

1. *Mechanical Construction.*

Because if the construction of any part from the first rudiments of the embryo to the perfect body be destroyed, the functions are no longer performed. Because although vast quantities of blood may be gradually taken from the system, a few ounces lost by one or two sudden gushes from a large artery, will produce instant death, by destroying the balance of the circulation. Because every part of the body being covered with a porus membrane, and only fluids being capable of uniting to it, to form nourishment, it is obvious, that the first entrance in the membrane must be from capiliary attraction.

2. *Chemical Principles.* The first operation the food undergoes in order to yield nourishment, is *solution* in the juices or liquids of the alimentary canal. When by capillary absorption it is brought in contact with the liquids of the body, but for the affinity between the two, there would be no combination and consequent assimilation. The assimilation of the supplies of the first nutriment to the particle constituting the rudiments or beginning fibre of the embryo; the subsequent formation and enlargement of the body, is affected by a similar operation. The changeable, compound liquid or blood, so assimilated is caused by the contraction and relaxation of the fibres, to pass into different parts, forming in some places by the laws or affinities peculiar to it in each state, muscular fibre, vessels, bones, and in short, every article found in the living body. The blood consisting of a few elements is thus converted into the thousand different appearances or substances of such variety of qualities,

which we find in animals; in like manner as we find all the millions and millions of articles constituting this globe, formed by the combination of forty or fifty elementary substances, in equal variety of state or circumstances. As in the last case, no one doubts but all these bodies are formed by the chemical affinities of matter, exercised in the conditions in which they have been placed so in the animal body, we should explain on similar principles. Then the living body is a laboratory of diversified construction; being so stamped or formed in the commencement by the creator of all conditions, that when supplied with the liquid blood, possessed of such a changeable nature, as to transform itself, (by the exercise of its affinities,) into every shape and form of matter found in the animal body. To explain myself more fully, I will add that it requires considerable effort of the mind to comprehend how the various states for the exercise of the affinites of matter can be created in the body. The subject will be better understood by referring again to the operations of matter not connected with the living body; and then to the wonderful construction of the animal machine.

The imagination must be greatly exerted to understand how two bodies shall be mixed with each other without any action in common temperatures. On adding an inconsiderable increase of heat the rays of heat penetrate, creating the state in which the particles can act on each other; the same also as when water is added, as the chemist will readily recollect. This is further illustrated, by the existence of several of the combinations of the oxymuriates in total darkness. On admitting light, the state is changed, and the compound is decomposed. To this I have to add, the composition of two airs; each shall be so transparent, each particle so small that no

magnifying glass can discern the slightest appearance of matter. Let them come in contact, as in the case of ammoniacal and muriatic acid gas, and they immediately form a visible compound, each particle of one uniting to so many particles of the other forming muriate of ammonia. So the particles of hydrogen gas, uniting to oxygen, form transparent water. These are facts, and the imagination necessary to understand them, is scarcely greater than that to understand the story of a saint about the devils of temptation, twenty thousand dancing a spanish fandango on the point of a needle, without discommoding one another.

The animal body is constructed with much more delicacy, many more marks of intelligence, than any thing in the world not connected with life. The various states or construction of each part are infinitely more delicate, than those of inanimate matter. In order to understand this, we have only to refer to the construction of any of the parts. We find the hairs of our head a hollow tube, their sides undergoing an operation to preserve the life of the hair. We find it impossible to penetrate any part of the body, not with the smallest needle without puncturing many vessels. We find the parts of the skin so small as to admit the passage of the most insensible perspiration. We find every part made up of the smallest parts, each part still smaller than the last seen; nevertheless each part or fibre which can possibly be seen, is found covered with the same membrane, from the papillæ of the tongue, to the surface of the body, from the cells separating the vitreous humour of the eye, to those separating the great masses of fat in the omentum. Add to this wonderful construction the influence of various degrees of heat, of electricity, changing on the change of our fluids, and most of all, of the incomprehensible influence of that spirit

called life, and surely we can believe in the wonderful variety in the states of each part of the body; favouring the exercise of the laws of its fluids in equal variety of results, rather more readily than we can account for those of the inanimate and vast variety of matter of the world around us.

The product of this mechanical and chemical operation is that great quality called *life*, without which, the machine ceases to be an active laboratory.

3d. After the production of animal life, we find it subject to peculiar laws; never however independent of the primary principles of its mechanical and chemical origin. Without the operation of external causes, rousing it into action, the life would speedily depart. The continuance therefore of this life is intimately blended with these external causes. It is this doctrine as before stated, suggested by M'Lurg and fully explained by Brown, which has attracted so much attention, often excessive administration ending in delusion. The air of simplicity it assumes, dispelling the mysteries, enveloping the old doctrines of life, gained innumerable advocates. But this doctrine like most others in medicine, has been extended too far: the author and the adherents contending that all diseases are attributable to too much, or too little stimulation; to be relieved by the abstraction or addition of stimulants; than which nothing more absurd has been advanced in medicine; as I shall hereafter shew.

The living body is not more remarkable for any one quality in action, than it is for the association or connection of all its various parts, more astonishing to us in states of disease, than in health. Every body is familiar

with the constant intimate connection and dependance existing between the brain, lungs, heart and stomach: the actions of each are known to depend upon those of the rest. I will only add a few instances of association of parts of unusual character. The introduction of a bougie into the urethra, the first time, is apt to produce sickness of stomach. A pain in the kidnies is attended with a symptomatic one in the thigh. A carious tooth, acting in the jaw bone, often produces disease in the most remote bones of the body. Doctor Physick thinks he has certainly discovered a singular connection between the stomach and the face, as in the ticque doloreux, which he has successfully treated with emetics. We all know a stimulus in the mouth will relieve sickness of stomach. Vomiting is often attended with a pain in the perineum. But in order to be understood fully, the association of parts of the body, it will be necessary to understand the history of all diseases, and the method of cures which are so frequently effected through this sympathy or consent of parts.

After finding the wonderful connection of each part of the body, the enquiry naturally arises, through what means is this association kept up, and through what parts do these causes acting on the body produce the phenomena of life?

It is very certain that the body can exist no more without the influence of the nervous system than it could without any of its general systems. But there appears to have been a strong inclination to refer the various sympathies of the body to the particular influence of the nerves. Because all our sensations come through this medium it is inferred one part feels the disease of another part, from the same principles. Strength has been

given to the doctrine by late experiments pretending to shew that secretion cannot take place when the nerves going to the gland are destroyed. Any one will be convinced of the excess of error in the whole doctrine, if he will walk the wards of a hospital containing paralytic patients. The paralytic limbs will be found totally distinct form every species of nervous influence: the spine sending the nerves shall be found to have destroyed their structure at their origin; nevertheless the part will secrete perspiration, fat, and circulate as in health. In addition to this we find parts sympathising with each other without there being the slightest traces of any nervous connection; we find one part taking on the disease of another, its vessels enlarging and encreasing their action, without our having sensation in the part so sympathetically diseased. It is clear therefore, that it is not through the nerves, that sympathy takes place.

I have before alluded to the cellular membrane, holding every part of our body together, from the invisible fibres contracting to cause the circulation in the transparent coverings of the eye, say of the capsule of the crystaline lens, to that holding the cells of fat. It lines alike and covers the fibres of the nerves as it does the cavities of the smallest pores of the transparant membranes, from those of the stomach to those of the skin. Hence I have no doubt but that it is through this membrane that parts sympathise with each other; that things operate on the body; that all the secretions are formed; as well those for the growth of the body as those for its constant use.

The sympathy of the cellular membrane is remarkably shewn, by the operation of the small pox. The smallest particle of virus is inserted in one part, and on the ninth

day the whole becomes affected. It is also shewn in œdematrous swellings, erysipelas, &c.

If it be not through this membrane, that sympathy takes place, it must be through the smallest fibres or most minute vessels of the body.

In whatever light this subject may be viewed, it is obvious that the state of each part, depending upon something we may or may not believe is different from the state of another part, and that each part may have its state variously changed, so that the fluids when brought to them, take on qualities by the exercise of their affinities in the particular state, as before mentioned in these remarks, and more explained in the essay on secretion.

That the secretions and changes of the body cannot be the result of the action of the vessels, as taught by the physiologists, appears obvious, as the vessels can only contract and relax, pressing forward the fluids, to the state where they assume their qualities. But it is more fully shewn by parts increasing their secretion, without increasing their action. In illustration, I will state the following: If a pint of cold water be taken on an empty stomach; or the stomach be filled with water mellon, the kidnies in a little time will be excited to secrete nearly an equal quantity of limpid urine. In this case the pulse is not increased, and no additional blood is sent to the kidney. If, instead of water, alcohol be taken, the action of every artery of the body will be greatly accelerated, those of the kidnies of course will be more active, than when the water is taken; nevertheless the diuretic effects, will not generally be one third as considerable. The explanation is, the water penetrates the pores of the stomach, produces a certain state in the cellular mem-

brane or in its vessels; those of the kidney sympathise, or take on the same state and the ordinary blood passing through the part, assumes the qualities peculiar to the state, thereby increasing the urine. Without any partiality to this doctrine caused by its originating from me, I have no hesitation in asserting that it is the only explanation of the fact I have ever seen.

In like manner the cellular membrane of those parts containing the common fat becomes altered. We find the ordinary blood passing through it turned into fat, without increase of vascular action. In another case it is formed into liquids of very different natures; in other cases, all these bodies are taken up and converted into blood, as is particularly shewn in the transformation of fat, producing emaciations as in continued fever.

This doctrine enables us to account for many occurrences in the body never before accounted for; but before enumerating more instances, it is proper to insert the following interesting remarks from the anatomical work of the late great and good Doctor Wistar.

"About the middle of the last century, it was generally believed by anatomists, that absorption was performed by the veins. This doctrine seemed to be established by the experiments of Kaaw Boerhaave, which are related, with many other interesting statements, in his work entitled "Perspiratio Dicta Hippocrati," &c. published at Leyden, in 1738. In these experiments, it appeared to the author, that when the stomach of a dog was emptied of its contents, and filled with warm water, immediately after death, the water passed into the minute ramifications of the veins of the stomach, and from them to the vena

portarum, and ultimately to the heart, in large quantities.

"In the year 1802, a memoir was presented to the national institute of France, by Messrs. Magendie and Delisle, which contains an account of some experiments, that have an important relation to the above mentioned subject. The authors being greatly surprised at the rapidity with which the poison of Java, &c. appeared to enter the sanguiferous system, instituted a series of experiments to determine whether these substances proceeded to that system by the circuitous route of the absorbent vessels, or by the shorter course of the veins. Two of their experiments are especially interesting. They made an incision through the parietes of the abdomen of a living dog, who had eaten a large quantity of meat some hours before, (that his lacteals might be visible from their distention with chyle,) and, drawing out a portion of the small intestine, they applied two ligatures to it, at the distance of five inches from each other. The portion of intestine between these ligatures was then separated by incision from the rest of the intestinal tube, and all the lacteals, blood vessels, &c. which passed to and from it, were divided, except one artery and a vein. A considerable length of this artery and vein were detached from all the surrounding parts, so that the authors supposed these vessels to form the only connexion between the portion of the intestine and the rest of the body. Into the cavity of the intestine thus circumstanced, they introduced a small quantity of the poison, and to their astonishment, it produced its fatal effects in the same manner it would have done if it had been introduced into the intestine while all its connexions with the body were entire. This experiment, they assert, was repeated several times, without any difference in the result.

"After several other experiments, they finally separated the thigh from the body of a living dog in such a manner that the crural artery and vein were left undivided. A quill was then introduced into the artery, and two ligatures applied. The vein was managed in the same manner. There was, therefore, no communication between the limb and the body, except by the blood which passed through the divided vessels and the quills. The poison was then introduced under the skin of the foot, and soon occasioned the death of the animal; its deliterious effects commencing about four minutes after its application to the foot. This experiment appears to prove decidedly that the blood is the vehicle by which poison, when applied to the extremities, is carried to the body; although it may not determine the question whether this poison was taken up by the absorbents or by the veins.

"Some other experiments made by the authors gave results, which are very difficult to explain. They wished to know if the blood of an animal thus contaminated, would produce similar effects upon another animal; and with a view to ascertain this point, they insinuated a small piece of wood, covered with the poison, into the thick part of the left side of the nose of a dog. Three minutes after the introduction of the poison, they transfused blood from the jugular vein of the same side, into one of the veins of another dog. About one minute after the commencement of the transfusion, the effects of the poison began in the dog to which it was applied, and continued until his death. Transfusion into the veins of the other dog went on during the whole time, and he received a large quantity of blood from the dying dog, without producing any effect. They varied the experiment in the following manner. The thigh of a dog was separated from the body; the artery and the vein were

arranged as in the former experiment; and poison was introduced into the foot. Three minutes after the introduction of the poison, the blood of the crural vein was passed into the jugular vein of another animal, and transfusion was continued five minutes without producing any effect upon the animal receiving the blood: it was then stopped, and the crural vein was so arranged that the blood flowed from it into the animal to which it belonged. This animal very soon exhibited symptoms of the operation of the poison."

"From these very interesting experiments the authors infer, that "*foreign matters do not always proceed through the lymphatic or absorbent vessels, when they enter into the sanguiferous system.*"

The experiments in the above cases, give great support to the theory I have advanced. The matter penetrating the cellular membrane would as readily enter a venous as an absorbent vessel; and hence we have no need to refer so frequently to the absorbent system.

The principles I have endeavoured to point out, enable us to account satisfactorily for the sudden absorption of new formed parts as granulations. As no absorbent vessels have ever been discovered on such granulations, we have no right to infer their existence. The disappearance must arise from the alteration in the state of the parts whereby new combinations take place of the matter forming the granulation. This is equally applicable to the sudden disappearance of large quantities of fluids in the cavities of the body and in the cellular membrane. An emetic, a cathartic, and other remedies have in one night caused the disappearance of incredibly large

quantities of fluids. The warmest friends to the lymphatic system cannot suppose that such enormous quantities as stated by writers of unquestionable merit, could possibly pass through these vessels, even if ten times more numerous. The membrane has undergone a change, or if not the small pores or vessels whereby the liquid in contact enters and assumes the qualities peculiar to it in the new state, and passes on or through to the next tube or vessel, forming blood, lymph, or any thing else.

When a part of the skin is severely pinched, sometime after a blister arises: we understand that squeezing the parts of course produces a change in their state, and consequently the ordinary quantity of blood arriving at the parts, cannot become transformed as in a natural state, but assumes the qualities of the liquid we find in the vesicles. A similar change in the state of the parts is produced when a scalding heat and excessive cold are applied. We are familiar with the influence of heat in changing states, and can readily admit the effects in the present cases. On applying blisters, and indeed on all such occasions, not a drop more blood than ordinary shall be carried to the parts, and consequently the conclusion is undeniable, that the common quantity of blood has been by the exercise of new laws or affinities transformed into the new secretion. It was no doubt to prevent the too great changes in the state of our bodies, which heat occasions, that they were formed to make such great resistance to the passage of heat and light. Death from electricity of course arises from the change in the state it creates, shewn by the liquifaction of the blood, &c. and not from excessive stimulus as heretofore supposed. The same state is produced in typhus and other fevers, marked by similar qualities of the blood.

When the state of the cellular membrane, fibre, or any other part which may be hereafter found the actual point of operation, is affected by being in contact with external matter, whether in the form of the metallic poison, arsenic or mercury, or in the most invisible gaseous form, as the particles of contagion, it produces a state peculiar to itself: then other parts sympathise; they take on a similar motion, and hence diseases commencing from a spot, are communicated to the whole system.

The doctrine of Dr. Rush, who really has done immense service to the science of medicine, at least in this country, is, that disease consists in convulsive or morbid action of the blood vessels. The doctrine arising from my views of the animal machine does not conform to this. The irregular action of the vessels, must be the necessary effect of the change of the state of the cellular membrane, or fibre, or pore, or some other solid, the original seat where the cause operated. The disease is in the altered state of the parts, and the indication is to relieve that state; to apply those things which will produce or excite a natural state. An increased or irregular action in the blood vessels can only be symptomatic of the affection of the solids.

The various diseases then of the body, amount simply to a change of state of the solids, wherein the fluids assume new properties or qualities disordering or deranging the ordinary operations of the fibres.

The various remedies then operate by entering the pores of the solids, there producing a different, more natural state, whereby all other parts sympathise and become of a healthy condition and consequent action.

This enables us at once to discard the fanciful and complex theory of debility and indirect debility; and to account for the various remedies for diseases so contradictory to such doctrines. For example we find the stimulus of heat, turpentine, &c. successful in curing burns, as we do an opposite treatment, the application of cold in the like cases. We find the same epidemic at one time cured by stimulants; at another, by evacuants. We find the prostration of strength following a debauch, at one time relieved by renewal of the intoxicating draughts, at another by depletion. To conclude, every one referring to experience will find practice often contradictory as to adding or abstracting stimuli, and often terminating with equal success. The doctrine I have suggested, reconciles these differences; the reputed great stimulants, as the free evacuations, all produced the same state in the cellular membrane or the seat of the disease in the solids: hence the parts restored to the same state, by such opposite means, do naturally return to their healthy condition or state, with the consequent natural action of the vessels indicative of health. Hence when quantities of a potent article are taken in the stomach as arsenic or opium, they do not increase the excitement or action of the system, but enter the pores of the stomach, producing a change of state, and consequent change in the fluids, incompatible with a state for the existence of life.

It follows according to these views that any affection or change of the solids, must be attended with a change in the state of the fluids. This is remarkably exemplified in fevers where the capacities of the fluids are so constantly changing for caloric; in one hour giving out large quantities to be made sensible, in another hour absorbing or converting as much sensible into latent heat, as I more

particularly stated on the subject of caloric. The change in the qualities of the fluids is equally obvious, even to the eye, in almost every fever; as exemplified in the great variety of appearances of the blood, from the buffy coat, to a very dissolved appearance. Hence the inutility of the practice once recommended, of transfusing good blood into the system of those whose diseased solids had made it bad, without at the same time putting the solids in a healthy state. Nevertheless, it is obvious, that the physician should always keep in view the qualities of the fluids, somewhat according to the exploded doctrines of the *humaral pathology*, as an important means of ascertaining the state of the solids. It is my intention at some future day to endeavour to throw some light on this subject, at least by arranging all the facts known on the subject, from the secretions of the mouth to those of the skin.

ADDRESS

TO THE

PHILADELPHIA MEDICAL SOCIETY,

ON THE

MECHANICAL MEANS OF RELIEVING DISEASES,

Read before the Society, during their sitting,
in January, 1819.

ADDRESS, &c.

MR. CHAIRMAN.

IT is my intention to bring to your view this evening some particulars of the principles and practice of medicine, which may appear different from those generally received. However irrelevant you may deem it, I consider it as introductory to this intention to make some remarks on the spirit and conduct of the systematic teachers of the medical schools. They have so worked upon the ardent feelings of the student, as to make nearly all of them even at mature age, warm adherents to one particular theory; leading them to exclude all other doctrines, and many remedies appearing at war with the system of explanation. I have long viewed these thorough and excessive revolutions in the doctrines of the schools, which have marked the rise and progress of our science, as one of the strongest barriers to its perfection.

While regretting the deprivations which the human family have sustained from this thorough rooting out of old, on the substitution of new theories, we cannot fail being forcibly impressed with the fact that it is fairly chargeable to the folly of the teachers. Contracted in their views, many in opposition to the plainest facts, would embrace and teach but one doctrine, pretending to account for all the phenomena of the body in health and disease, according to the favourite hypothesis. Others with the ambition to be leaders in the science, appear to have laboured to engender doctrines, only that they may be esteemed different from those of other professors. Not satisfied when they have discovered a new principle in our science, with applying it to a moderate or limited degree, they would extend it until it became as distorted and absurd as all preceding systems. The vanity leading them to figure as the sole theoretic lords of the day, has often induced them to attack with animosity, and spare no means to undermine and demolish every part of the doctrines of predecessors and rivals. Hence so many systems in medicine have sunk with their authors to a burial. Hence those who would become an eclectic, have to wade through such accumulated trash, to select the useful fragments of the various doctrines of the contending schools.

Had the famous Paracelsus exhibited more respect for the doctrines of Galen: had Sthall, Hoofman and Boerhaave, borrowed more from the chemical theory of Paracelsus; had Doctor Cullen have paid more attention to the doctrine of the morbid state of the fluids as taught by Boerhaave; had the Lord Bacon in medicine, meaning Doctor Brown, reared a part of his edifice on the theories of Cullen; had Darwin with his associated actions, and Doctor Rush with his convulsive motion of

the blood vessels, shewn more magnanimity and acknowledged their obligations to Brown; we may have had at this time, *what we have not*, a text book in medicine applying as it should the doctrines of many of these teachers, only to a limited and proper degree. Erroneous as it may appear to the enthusiast in the particular sects of our profession, I have no hesitation in declaring, that it is impossible to have correct principles to guide our practice, without referring to parts of the doctrines of many different authors. To confirm this, take some feature in those systems, presenting on a cursory glance points most at war with the at present generally received doctrines. The first presenting to my mind is the circulation of the blood. In ancient times, before the discovery of Hervy, it was taught that the blood circulated in parts, in consequence of some action in the part itself. On the discovery of what is termed the circulation of the blood, it was believed, and is still believed that pulsation of the arteries arises solely from the action of the heart. Unhesitatingly as this would be admitted, by the converts to this theory, it is to a certain extent, *not true;* for it is proved that a part of the old doctrine is correct.

It was before this society, that Doctor Firth, years ago, proved that an arm immersed in olive oil, had the pulsation of its arteries reduced twelve strokes in the minute, fewer than in the opposite arm at the same time.

Next, let me refer you to the discarded rule of applying any of the principles of mechanics to our bodies. Is it not by mechanical operation that the membranum virilè is brought into effective action. It is by the powers of suction that the infant receives its first sustenance, as it is by its gravitation that its birth is expedited when the parturient woman is standing. We all know that

food is prepared for our stomachs, in consequence of the operation of grinding in the mouth. As to relieving diseases on such principles, where is the physician who will deny that it is for lessening the pressure of the volume of blood, that he elevates an inflamed limb to effect a cure? Are not the contents of the bowels purged away in order to relieve the effects of the bulky matter? Scarce a day passes over without the cure of cancerous or other tumours by pressure, or without great relief from friction of the skin, in cases of internal disease. It is equally certain that by the support of a bandage that distended veins, and rheumatic limbs are frequently relieved.

But passing by the mechanical remedies for the present, let us refer to such as may be denominated chemical. Is it not obvious even to the very persons whose lungs seem so filled with their imponderable fluids, especially vitality, that chemical changes do take place in our bodies, and that some cures are effected on the chemical principles exhibited in a laboratory. Let me ask if it is not from a solution in the stomach that food is rendered fit for absorption by the lacteals. Every one knows that it is from crystalization, that the enamel of the teeth is formed; and that calculi are formed in the gall, and urinary bladder. The large quantities of airs, created in the alimentary canal, are the result of chemical action. These airs differ in qualities very materially from inodorous to offensive; from incombustible to inflammatory, even to such a degree, that a man in gaysome mood attempting to extinguish a candle from his anus, has had his wind to blaze and burn the adjacent parts. When the secretions of the stomach become sour, do we not cure by neutralizing the acid with lime aud the alkalies? When the contents of the bowels become acrid, and irritating do we not remedy by the effects of yeast and charcoal in

destroying their activity? The same doctrine extends when we apply charcoal to phagedenic and other ulcers, the secretions of which keep up the foul action, in like manner as the gastric juice of a particular quality, excites the secretion of a similar juice in the stomach. There is proof beyond question, that common chemical changes in our bodies take place, which is derived from many facts. The frequent and spontaneous combustion of drunkards, the formation of pure volatile alkali on the skin, and many other chemical compounds, afford irresistable evidence.

We have a further exemplification of this, in the abstract of the history Count Buffon has given of a race of people on the coast of Africa, whose diet being confined to a species of locusts, become old at our middle age, and die in consequence of a sudden transformation of their flesh into the insects on which they have lived. It was fourteen years ago, before this society, that a most respectable physician, Doctor Pascalis, now one of the editors of the New York Medical Repository, declared that he was at Dijon in France, where a drinker of enormous quantities of wine died. On the third day the coffin was opened in church previous to interment, according to the custom of the place. No sooner was it opened, than all the flesh of the body flew up in millions of the flies peculiar to wine; the whole spreading throughout the church, obscuring the vision of the priests, and astounding and dispersing the congregation.

Passing over the chemical doctrines, let us refer to what so many are disposed to ridicule, that something which when it cures diseases without our aid, is called *nature;* I will not offend prejudices by applying the old name of "vis medecatrix naturæ." Will any physician

dare to deny, that the powers of nature often effect more good, than all his boasted prescriptions, that with all his reasoning powers he could ever suggest a better mode of relieving the carious and destroyed bodies of the vertebræ, than we have seen exhibited in the union of their spinous processes. Again; notwithstanding, the general condemnation of Doctor Cullen's views of spasm, will any practitioner refuse to acknowledge, that he administers medicine to relieve constrictions, or in other words spasm; as in cramp, hysteia, colic; and indeed is it not to the relaxing anti-constricting effects of antimony, that it is used in luxations, and in many fevers? In other cases it is as common for us to effect cures by overcoming the diseased action, by means of increasing the general excitement of the body as recommended by another theorist. Sometimes we relieve by revolutionizing or destroying the sympathies of the associated parts, as so strongly enjoined by the author of Zoonomia, and lastly, are we not often guided in our treatment of the sick, striving to equalize arterial action, whenever we observe the convulsive motion of the blood vessels, as so ably pointed out by Doctor Rush. All these various doctrines, however to some they may seem contradictory, will to the judicious practitioner, prove of importance in directing his prescriptions, when made according to sound reason. They are entitled to a share of the consideration of every man who wishes to be a fair eclectic in our science. I repeat they would be respected and inserted in our elementary books of medicine, were it not for that overweaning spirit in the teachers before noticed, so eternally leading them to suppress, undermine, and blast all theories, not of their formation or of their adoption. Lest some might consider this as an assertion without grounds, it is proper for me to offer some particular evidence; and *the more proper to do* it without having

reference to the innumerable examples afforded by those who have gone to their graves. We will therefore leave their spirit with their bones to slumber in oblivion, while we confine the view to some unfortunately now imitating their pernicious example.

Within but a few days we have had an instance humiliating to the feelings of those hoping for the perfection of human nature. It must be known to many, that the great surgeon Mr. Pott, did not unite with a certain sect in almost idolizing every thing from the noted Mr. Hunter. Years ago this gentleman published his discovery of curing the caries of the spine of children by keeping up discharging sores for months on the back, opposite to the part affected, a method found eminently successful. A teacher of the Pennsylvania school of the highest character; a warm convert to the doctrines of Mr. Hunter, when speaking of the disease passed over in silence Mr. Pott's mode, but carefully announced his *new method*, by keeping up sores from blisters on the back, as pointed out by Mr. Pott; *leaving to his* kind listeners to guess at the difference in the effects of ulceration by issues, or by Spanish flies. So deeply implanted the aversion to acknowledge an improvement by a cotemporary, that although twelve years ago he read of the discovery of the best mode of closing the mouths of bleeding arteries by keeping their sides precisely and equally in contact, by means of a small pair of forceps, applied only for a few hours, to produce uniform compression on the sides of the vessel, (instead of those inequalities in the folds caused by a ligature,) nevertheless, without noticing the improvement he recommended a doubtful plan of his suggestion, to tie the arteries with some rottening ligatures leaving the patient exposed to all the dreadful dan-

gers of hæmorrhages when ulcerative action is excited in the arteries.

The same spirit was exhibited in *the slight notice*, when dismissing the subject of fractured thigh bones, which he took of Doctor Hartshorne's superior method of treating the fracture; although he was reminded on the day that he ought to mention it, and he had to refer to the cases successfully treated by the doctor in the hospital to shew that the injury of the fracture could be fully repaired. In other cases, when the teachers not like the one just referred to, have no claims to originality, *view their* efforts, and you will find them as strongly marked with an objectionable spirit. Let a rival cotemporary gifted with an inventive genius suggest an improvement, and behold, if it appear plausible, the lecturer sets to work, labours to cry down the discoverer until he is reduced to their own standing, from which they could not hope to rise. Instead of acting on an enlarged scale, encouraging every effort to improve, and conciliating every friend of the profession, they view with jaundiced eye the teachers of all neighbouring schools. Scarcely twelve months have passed away since the young medical gentlemen assembled in this city had an exemplification not shortly to be forgotten. A professor having dignified his chair, by encountering arguments with a graceful oath, indulged in a flight of eloquence, having attained in his fancy to that rare quality of gently descending, so earnestly prayed for by Milton; he elevated his hearers to vast expectation on making an overwhelming comparison. He announced that there would be as much folly in comparing a certain doctrine with the one which he had preferred, (think of the faint glimmering of a star, compared to the splendour of a summer's sun,) when lo! it was more sublime! it was as to compare the University of

New York to that of Pennsylvania—Wonderful genius —the grateful faculty of future ages will be full of thy glory! While they carefully forget that president J. Augustine Smith, late of the New York University, in intellectual attainments, transcended the then collected medical professors of this "Punctum Saliens" of America. Like the woman mentioned by Lord Orery, on making a noise in her own ears, it was strangely fancied that it was necessarily heard by all others in the world. But I will dismiss this disagreeable subject, praying for a renewal of the days of a Shippen and a Wistar, of a Rush and a Barton, when it shall not again be conjectured on hearing of this "Punctum Saliens" that it meant the point for intrigue and imposition among trustees.*

My bringing to your view, such examples of a poor policy and pernicious spirit, would be improper, were it not that they tend to teach us the important lesson, that we should never suffer our minds to be contracted, by receiving the doctrines of but one of the medical theorists; and that we should never degrade ourselves by pursuing an illiberal course, to any of our cotemporaries, *honestly* labouring to increase the means of relieving the miseries of mankind.

It is not a subject of surprise, that amidst the general wreck of theories, and the crush of authors, that the remedies for diseases, should have undergone equal revolutions upon revolutions. In one age, we find almost every weed and plant sought after with zeal, compounded with care, and plentifully poured into the bodies of the diseased. At another period, the bowels of the earth

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* See note marked A, at the conclusion.

have been ransacked, new minerals discovered, exposed to every heat, and to every combination, forming thousands of prescriptions to be administered with equal industry. At one time under the banners of the Lancet, and Mercury, the followers of the profession of Hypocrates, advance to cut asunder the cords of every complaint; to prevent, if you will beleive them, any man from dieing of *disease*, and only occasionally they will trouble their hearers with the *trifling* circumstance of death from debility, immediately after the disease of the patient had been so effectually cured. Next a new practice rises in the medical world; the lancet retires to its sheath, the mercury is neglected on the shelves, and general stimulation becomes the order of the day. Hear then the confederated enthusiasts, they will allow no man to die in their presence if supplied with excitements, they will wrestle with, and overpower every diseased action; in short if you believe them, they will work such wonders in the bodies of their patients, as are worked in their own imaginations, by their participation of the good stimulant of alcoholic and vinous fluids. In one section of the medical republic, the febrile patient is exposed to the use of cold water almost to every part named in the catholic excommunication. In another place, it is with no less zeal banished for the substitution of equal quantites of warm water.

In Edinburgh it has been but lately most strongly urged by Doctor Hamilton to treat fevers of low action, with frequent and powerful purgatives, so as thoroughly to empty the bowels; in the Pennsylvania Hospital, one of our members, but a short time since, pursued an opposite treatment in similar cases, and not one of his many patients expired while under the operation. He carefully enforced the exhibition of a few gallons of ta-

piaco and soup every day, distending the bowels so as to produce, as he stated gentle coma, or in other words, the sleepy quiet state, which eating did upon Sancho Panza, with the addition of a contented mind! Just in such a manner as a full stomach acts on all of us. Whether the plan of emptying or that of stuffing the intestines will ultimately prevail, I am unable to determine, as of the former I have no experience, and of the latter but a solitary instance, and that of an unlucky dog, subject to periodical fever. The case occurred in my youth before I had learned the almost universally admitted fact, that fever, cured without proper evacuation will leave abdominal congestions, ending in schirosities, dropsies, &c. The dog not being so obedient as hospital patients, I had him held, and in his guts injected a large quantity of hot stimulating pot liquor. It effectually cured his disease, but I ought not to omit stating as did the author of the eating plan forget to do, what took place after the cure; he happened to die from the effects of the distension: whether in consequence of congestion, I could not tell as there was no dissection.

Leaving however to others to determine the degree to which these projects shall rise or dwindle, I shall proceed to those points in principles and practice which may properly be called mechanical which I wished to bring to your consideration this evening. It would be useless to take up your time in repeating what was said while glancing at this subject in a preceding part, or in stating any of those particulars which are universally known. I will pass on to what I suppose is not so generally understood of the subject.

Function of the Stomach.

The first observation I have to offer relates to the stomach. That this viscus gets large when you fill it, and gets small when you empty it, I need not refer either to the inventor of cures solely by the purging or by the cramming plan. Now simple and unimportant as this remark appears to be, I wish it to be remembered; for this operation of enlargement and subsidence of the stomach is no doubt one of the most important functions performed by any organ of the body. The intimate, the delicate connexion between the stomach and other parts of the system, is familiar to all of us.

We have heard of its exemplification, by the passage of a cannon ball before the stomach, and much more frequently by the drinking of cold water, producing almost instantaneous death. Any considerable distention of the stomach almost invariably produces stupor, increase of arterial and aversion to muscular action; the subsidence of it is followed by acuteness of perception, increase of acrimonious feelings, and a desire to exert the muscular powers; till fever ensues and ends in death, generally on the eighth day. As no one can doubt of the intimate connexion of the stomach with the most vital parts of the body, it must readily be admitted that all variations from its habitual actions, must have considerable effects on the general system; in the numerous cases of death which have occurred from starvation, dissections have unquestionably concurred in proving, that the persons did not die from want of blood; they have all had unusually

large quantities of this fluid. This will cease to appear unaccountable, when we observe the powers of the animal system to convert the inactive parts, especially the fat into the blood, necessary for the body; as in the case of fat bears, retiring in the commencement of winter to their dens. They suck their paws, and with wind distend their stomachs, while their systems convert the fat into blood; so that they turn out in the spring full of blood, and relieved from fat. Just so we find it with man during a febrile attack; he will take no nourishment for weeks, will keep up the action of his stomach by drink; shall daily loose blood, and at the close of his fever shall have as much of this fluid as in the beginning.

This accounts for the abundance of blood in cases of starvation, and shews that we should look to some other cause of the death which ensues. My own mind is clearly convinced that this death arises from want of action in the stomach, and not from want of that which makes blood. This led me to the suggestion of saving the lives of starving people, not by eating their own flesh as they have often done in the most shocking manner, but by sucking their own blood. If each man exposed to starvation would suck a pint of this fluid daily, in its natural state, if obliged by situation or if circumstances permit, if he would mix and boil it with water, there can be no doubt but that they might live, to use a scripture expression, forty days and forty nights, without danger of death. Powdered wood, saw dust, especially charcoal or any bulky article not obnoxious, might be added to aid in distending the stomach. The partial experiments I have made to prove this doctrine, are in too imperfect a state to be laid before you; but I regret it the less, as the truth of what is stated, appears almost self-evident, requiring no experiments to establish the excellence of

the practice in cases of starvation. I am so sanguine of the great and good effects which would result from it, that I would rejoice if it could be impressed on the minds of all the unhappy sufferers exposed to the deprivations of ship wreck, sieges, or any other of the causes of famine. I will conclude the remarks respecting the distension of the stomach with the fact, that its enlargement by eating food not stimulating, is often in cases of fever, an effectual means of restoring its natural state and with that the healthy action of all the associated parts of the body.

Since writing the above, the following has been handed me; shewing the correctness of the doctrine I have laid down; and consequently, that a general attention to it, must prove of importance to mankind.

"The effects of *famine*," says Humboldt, "are common to almost all equinoctial countries. In South America, in the province of New Andalusia, I have seen the inhabitants of villages, compelled by famine, disperse themselves, from time to time, through uncultivated regions, to seek nourishment from wild plants. The missionaries employ in vain their authority to prevent this dispersion. In the province of *Los Pastos*, the Indians, when the potatoes (*pommes de terre*) fail, flee to the highest elevation of the Cordillere to sustain life by using the *achupallas*, a plant related to the genus *pitcarnia*. The Otomaques at *Uruara*, on the borders of the Oronoque, eat for several months, a clayey earth, to absorb the gastric juice, and to diminish, in some measure, the torments of hunger. In some Islands of the South Sea, on a fertile soil, in the midst of the beauties of nature, (*au sein d'une grande et belle nature*) famine drives the inhabitants to the dreadful necessity of being cannibals.

Under the *torrid zone*, man, careless, improvident, and phlegmatic, experiences, periodically, that want of nourishment which the industry of civilized people banishes from the more sterile regions of the *north*.

Of the Breasts of Women.

The next subject I shall mention relating to mechanical operations in our profession refers to women. It is known that their breasts have a great susceptibility in any state to secrete milk. By gentle rubbing and sucking them, they may be readily made to take on this milky action. There have been interesting proofs of this fact, as in cases of infants loosing their mothers, and having to sleep with some virgin relation. During the night they have got the nipple in their mouths, and by dint of repeated attempts at suction, touching and pressing against the breast, they have excited the flow of milk, and have been reared successfully by the supply so obtained. The intimate connexion between the uterus and mammæ, is known to every physician; the one is scarcely ever affected without the sympathy of the other. This important point in the female œconomy, with the facility with which their breasts could be excited, led me to suggest relieving the diseases of the womb through the medium of the mammæ. I have warmly urged the excitement and keeping up for months the milky action to relieve those cases of habitual abortion, where the fœtus is almost regularly discharged at fixed periods. In cases of barrenness, arising from the refusal of the parts to take on their natural action, this treatment of the mammæ presents itself as the most effectual mode of rousing the genital system. This affords still greater prospects of re-

lieving the uterus when there is great determination of blood to it, as in excessive flow of the menses. Even in the suppression of these periodical discharges, such treatment might lead to some more healthy action in the parts. Since suggesting this means of relieving women,* but one case has occurred, and the remedy was completely successful.

But to relieve the diseases of women, is not the sole benefit which appears to me may be derived from causing the breasts of women to give milk in the way suggested. A considerable portion of the sex remain single for life, in no manner do their systems assist in the great work of rearing the human family. It is also true that many mothers from diseases, are unable to give suck to their offspring; while others die before the period of weaning. Now in order to remedy these evils, I propose that the unmarried females should be caused to supply the milk for the offspring of their relations. It would keep them endearingly employed; it would necessarily add to the preservation of their health, and might prove a powerful means of mitigating that acrimonious spirit characteristic of a considerable number of the elderly maids.

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* In a work entitled "Letters to Ladies," published.

Of the Air Pump.

The last subject which I shall offer for your consideration, is the diminution of the pressure of the atmosphere on the body, where there is disease of the internal parts. This is a subject which has long presented itself to my mind, as a most important mean of relieving a variety of the diseases of mankind. It was as early as the year 1805, that the idea occurred to me, in consequence of making some experiments on dogs, to ascertain the influence of hepatic obstructions, in causing conjections in the abdominal visera as sending their blood through the liver. On the application of ligatures to parts of the liver, and in proportion to the parts compressed, I remarked the extraordinary engorgement of the vessels of the stomach and particularly of the spleen. The experiments were detailed in my Inaugural Essay of the succeeding spring. These results, with the fact of the frequent enlargement of the spleen in cases of yellow fever, bilious, intermittent and other fevers, marked either by a disease or sluggish action of the liver which refuses to take on the increased exertion of other parts, induced me to suggest the application of the air pump, to the surface of the body; by this I expected to create a strong determination of blood to the skin; while it occasioned the deposit of some of it in the cellular membrane until the relief of the internal parts; when the absorbents would take it up, and carry it into the general circulating system for the uses of the body. After the late Doctor Rush read my remarks in the essay alluded to, he was impressed with the effects on the spleen of this obstruction made by art in the liver; he took new views of the uses of this viscus, and published a work

some years after representing it as serving a kind of waste gate to the body, in fever, *receiving* the superfluous blood to be given up to the general circulation, when the diseased action subsided and the system required the restoration. My observations during a practice of medicine, at one time very extensive, deeply impressed my mind with the extreme imperfection of all the ordinary means of relieving internal congestions. In addition, I have witnessed many cases, where the depletion necessary to subdue the violent paroxysms of fever, had most fatal effects on the constitution of the patients after the disease subsided. To every one, it must have appeared a most important desideratum, to be able to abstract the blood during the paroxysms of fever, so that it might get back in the circulation, after the subsidence of the disease. Nothing has ever appeared in my judgment half so much calculated to effect these objects, as an air pump, constructed with the necessary machinery. Nevertheless, I have been so situated, that until within a few days I could not procure an artist to make the apparatus. The plan adopted, is to affix the pump to tin cylinders adapted to the size of the upper or lower extremities, also to contain all the body excepting the head; a bladder is to be tied around the mouth of the cylinder, to encircle that part of the body which may be introduced in order to exclude the external air. After which the air is to be extracted as long as the patient can endure the operation. The consequences must be, that the fluids will rush to the surface of the body, enlarging the capillery vessels, so as to relieve internal congestions; at the same time, the new energies of the system will be roused into exertion and the diseased association must be revolutionized so that the body may retrograde to its natural healthy state.

This apparatus for reflecting these objects, shall shortly be exhibited to this society, and to obviate all doubts of the feasibility of applying the machine, I will state that every difficulty has been anticipated and removed; so that the only point for consideration is, what good can be derived from the application of the air pump, in lessening the pressure of the atmosphere on the surface of the human body? That it is a most powerful machine, capable of producing immense effects on the body no one can deny, who know the weight of the circumambient air; or who has ever had his hand over some orifice of only a partially exhausted receiver. That it can do the constitution no kind of injury, is rendered unquestionable by viewing the effects on a small scale of dry cupping. Indeed it holds out so many prospects of essential service without the shadow of bad consequences, that I shall extensively apply it in the way I recommend, not waiting for the confirmation of tardy experience. In all cases of low fever, I would hail the air pump I have suggested, as one which at the will of the operator, may be a most gigantic, or one of the mildest means of effecting relief. The sudden loss of strength in typhus fever, the almost total insensibility of the intestines, to stimulants; with the engorgement of the visera appearing in cases of dissection, prove that the system is not debilitated, but prostrated. You are acquainted with the dangers and difficulties, occurring in the treatment of this disease. There is scarcely a family which has not felt its ravages, and there are but few physicians, who treat it in the same manner. Almost every article in the Materia Medica, has been resorted to, for relief; from real brandy to true spirit of turpentine; from pouring in the stomach fixed air which extinguishes fire—to phosphorous which so rapidly raises a flame. It is my decided opinion, that before giving up the patient, and

both before and after going to prayers, as so smartly suggested by a professor of the practice of medicine, I would use the air pump. It could not fail to relieve the internal parts and to revolutionize the actions of all parts of *the body*. I am very much mistaken in all views I can take of this disease, if its proper treatment ought not to be confined to the free use of the air pump, to occasional evacuations, and to keeping from acrimony the contents of the bowels; with the addition of such means as may tend to restore the natural actions of each part, particularly the stomach and alimentary canal.

This remedy of the air pump presents itself as a most important means of arresting the paroxysms of intermittent fever. The forming stage of this disease you know to be marked by a general detumescence, a shrinking in of the surface of the body, symptoms which seem to cry aloud for blood on the surface. In the shivering state, it is called for almost from the very tip of the nose to the end of the toes. In all pulmonary attacks, the use of the air pump must prove a powerful auxiliary to the other remedies. I would resort to it in consumptions as a kind of hobby-horse; expecting much more good from its daily use, than from the horse riding, so strongly recommended by Sydenham. In short without entering more minutely into particulars, there are no cases of engorgement either of the large blood vessels or any of the internal parts of the body, by no means omitting cases of inflammation of the brain, in which I would not apply the air pump repeatedly, and as long as it could be endured, with a confidence amounting to certainty that *relief* would be afforded, effectual and prompt.

You have now, Mr. Chairman, my views most sincerely stated of a remedy in its infancy; but which I

believe will increase rapidly to perfect maturity, when properly and fairly introduced among the faculty. It is worthy of a better support than I can yield. I submit it for consideration in the hope that it will receive no rude attack; and that those disposed to be assailants, may bear in mind, that should they become hereafter subjects of its operation, they may be justly pumped, until they shall not have left wind enough to beg for what ought to be shewn to all new propositions in medicine, "*moderation and mercy.*"

Note.—**The Air Pump as above described, I have had constructed by Mr. Willbank, corner of Seventh and Arch streets, Brass Founder, Philadelphia. Its application is extremely easy, and Mr. Willbank will make any number for the physicians of the country, as they shall require.**

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Note A.

In explanation of this paragraph, I have to state that Dr. Chapman in his introductory lecture, called Philadelphia the "Punctum Saliens" of America, a most modest name; no doubt he thinks himself the head of this point! But in order to give the reader a specimen of his eloquent genius, I will here offer one of his first flights taken from his Inaugural Essay, published in 1802, and in the Pennsylvania Hospital.

After making some trite general remarks, as "credulity is the ignus fatuus of science," he states,

"Some of them were mere ephemera, the short lived beings of the day, who scarcely existed before they were consigned to eternal oblivion. OSTENDUNT TERRIS, HUNC TANTUM FATA, &c.

"Fate shewed them, but so quickly dropt the scene,
"'Twas straight forgot that they had ever been."

"While others sustained an existence superceded by theories equally absurd and untrue.

"From the collision which attended this clashing of opinion, this warfare of theory, was sometimes emitted a spark which illumined for the moment. But it was the temporary meteor of the night. It vanished before any definite conclusion could be drawn; and left the subject in augmented darkness and obscurity. In examining, therefore, the opinions of my predecessors, I shall be excused if I sometimes betray scepticism, and often doubt in hesitation, in admitting them. At this enlightened æra, when science is pervaded, &c."

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The following is from Dr. M'Lurg, page 38.

"But it must be remembered, that when we take up the defence of system, it is merely in a general view. Nor should a vindication of the privilege of reason in medicine, be extended to all those modes of exercising it, that have frequently proceeded to the length of licentious abuse. A description of the variety of opinions which they have produced, would look like an attempt to give a history of the caprices of the human mind. Some of them were scarcely born, before they were buried in oblivion. OSTENDUNT TERRIS HUNC TANTUM FATA, &c.

"Fate shewed them, but so quickly dropt the scene,
"'Twas straight forgot that they had ever been."

"While others, winged with stronger fancy, mounted above the weak view of their age; and,

> "Through a cloud,
> "Drawn round about them like a radient shrine." *Milton.*

they shone, for a time, the object of universal admiration. But they were mere meteors of the night, and as soon as we were in a condition to examine them, they disappeared. Perhaps, many of those theories, which at present, look so firm and durable, are destined to a similar fate. One would think that, like the bodies of the sensible world, they were continually decaying, and continually reproduced in new forms."

The reader comparing the extracts from Dr. Chapman's Essay, published thirty-two years after Dr. M'Lurg, must be forcibly impressed, that the prospects are deplorable where a young man, at the age when the noblest feelings of the mind generally appear, will resort to such art in decorating himself with the plumes of another. The detection of this plagiarism, committing an improper act, to secure even if escaping detection, not substance, but shadow—not ideas, but dress—has effectually changed the high opinions I once entertained of this *eloquent* gentleman of the "*Punctum Saliens*," of *his* creation!

At his next *christening* of Philadelphia, I hope he will be so *improved* as to know that if preference is to be given to any place in the Union, justice and truth require it should be done in favour of "THE ANCIENT DOMINION," giving presidents as she has of the greatest science to America.

REMARKS

CONCERNING

MIASMA AND LIGHT.

TAKEN FROM DISCOURSES ON THE LAWS OF MATTER,

PUBLISHED IN 1806.

REMARKS, &c.

BESIDES the impurities of our atmosphere from the above causes, it is frequently rendered injurious to animals, in consequence of containing substances which the chemists, cannot detect. These are the great variety of contagions, or infections, which produce small pox, measles, malignant or yellow fever, &c. The nature of these substances is unknown, and their existence is only inferred from effects they produce on living animals, and particularly on men. The chemists have been unable to do any thing with any of them, except that causing yellow or malignant fever. This is designated by the term *miasma*. It is a compound formed during the putrefaction of animal and vegetable matter, in the circumstances often existing in warm countries, and particularly in cities. Immense quantities of it have lately been generated in the United States; and New York, Philadelphia, Baltimore, Charleston, Savannah, and New Orleans, will long bear traces of its ravages, as well as several European cities; amongst which, Genoa, Leghorn, and Cadiz, have most suffered. When this miasma is in its strongest state, it excites the plague: as we frequently find in Egypt, and throughout Asia and Africa. In a less active state, it excites the jail, hospital, and

ship fevers; also the malignant or yellow fever, which is observed in the East and West Indies, in the United States, and southern parts of Europe. In a still less active state, it produces the fevers all over the world, called billious or remittent, and intermittent fevers.

The means of correcting the airs containing miasma, have long occupied the consideration of chemists. It is only of late that successful methods of effecting this have been discovered. Experience has uniformly taught, that it is folly to expect any good from large fires, from flashing gunpowder, from smelling camphor, tobacco, or any of the volatile vegetable substances; even strong common vinegar, so universally used, is found of little or no service.

Dr. Smith of London, discovered that the fumes of the nitric acid had a happy effect in purifying infectious air, particularly that arising during the putrefaction of animal matter. To dis-infect rooms and ships, the Doctor advises that a quantity of nitre be warmed in a glass vessel, and an equal quantity of sulphuric acid poured on it. When this is done, the fumes of nitric acid will ascend in the form of red clouds, which quickly spreading around will destroy the contagion very effectually. The quantity of the articles used in this process, should be regulated by the quantity of air to be purified, allowing two ounces of the mixture to a common room. By using these fumes in England, the jail, hospital, and ship fevers have been at once arrested in their progress. The same happy effects followed its use in the north of Europe, and also in the East Indies, in some remarkable instances. The advantages resulting from this discovery were so great, that, the British parliament, in confor-

mity to their liberal custom of rewarding useful men, gave a considerable sum of money to Dr. Smith.

Notwithstanding the great value of the fumes of nitric acid in correcting contagious airs, Guyton de Morveau, and some other French chemists, have ascertained that the fumes of the muriatic acid are superior. These have been found to be particularly successful in destroying the miasma causing the yellow fever, and other epidemical diseases of hot countries. In order to diffuse these fumes in the air, to one ounce of dried common salt should be added the same quantity of sulphuric acid diluted with half as much water. When this is done, very pungent fumes will ascend (which are the muriatic acid, gas or air) and spread around in sufficient quantities to purify the air of a large room. Another preparation, however, of this acid, is found still better. About three ounces of salt, half an ounce of the powdered manganese used by potters, two ounces of the sulphuric acid, and one of water, should be mixed together in a warmed glass vessel. This being done, a most volatile air (called the oxi muriatic gas) will ascend and completely destroy the contagion, or miasma of a large room. Morveau gives a decided preference to the use of this article over all others in purifying infected places. By it he completely corrected the air of a church in Dijon in France, which was so corrupted from putrefaction that no one could enter it with safety. With the happiest success it has lately been used in destroying the miasma, which operated so fatally in parts of Italy, France, and Spain.

It should be observed, that more caution is necessary in the use of the fumes of muriatic acid than in those of the nitric, which can be inhaled with safety by any one. My friend and fellow graduate, Dr. Hartshorne of Alex-

andria, (now of Philadelphia) made some experiments with the fumes of the muriatic acid; by which it appeared they were very fatal to the life of mice and puppies. Although they have been respired by men without injury, it would be well to be cautious in not remaining too long in the room when they are escaping.

These fumes, no doubt, act by uniting to the miasma thereby rendering it neutral. The expense of preparing them is so trifling, that they should be used in all suspected places. By using them in ships, and about their contents, really more good will be done in one hour, than can be produced by the longest quarantine they are made to perform. The benevolent President Jefferson has called the attention of Congress to this subject in a late message, with a view to remove the grievances arising from quarantine laws. Surely the merchants should strive to hasten the abolition of these restraints on commerce, by introducing the perfectly safe, and expeditious method of fumigating their ships and goods as above proposed.

Some persons have attributed great virtues to slacked lime; but with what propriety remains to be determined. Probably it only acts by resisting putrefaction. However there is a doctrine which has for its support the opinion of Dr. S. L. Mitchill, that the lime and also the alkalies operate by absorbing the miasma, which the Doctor calls the *sceptic acid.* At all events in the cities, where the privies are very offensive, the lime thrown in has a happy effect in correcting the smell of the air. Perhaps in such cases it would be better and less expensive to use the fumes of the acids. The lime might be better employed, if sprinkled over the narrow and dirty streets in the unhealthy parts of the cities, as it could certainly correct putrefaction.

From a variety of facts, which have been accurately attended to, it is well ascertained, that the activity of miasma is lessened, nay, completely destroyed, by a free circulation of, or dilution with, atmospheric air. Hence, during the most fatal plagues which have prevailed in Aleppo, Alexandria, and Grand Cairo, in Egypt, the wealthy people safely retire to the upper stories of their houses, where the miasma cannot ascend from the streets without great dilution with air. It would be advantageous if such as are obliged to remain in our cities, during the epidemical fevers, would reside in the upper parts of the highest houses. The free ventilation of ships and goods coming from infected places, should also be attended to. It has been found, that fresh clay has great power in absorbing or destroying miasma. Perhaps it would be best not to pave the streets of the cities at all, or sometimes to plough up the pavements when the contagion seems generated in great quantities. But to conclude with this subject, I shall insert a letter which I wrote to Dr. Rush of Philadelphia, under the impression that it may contain an useful hint.

UNITED STATES NAVY-YARD,

New-York, 15*th June*, 1806.

Dear Sir,

YOU will, I hope, excuse my troubling you at this time with suggestions concerning the means of arresting the progress of the fatal epidemics, annually desolating the first cities of our country, as there is no person to whom I can communicate them with more propriety than to yourself. For what medical luminary has so long

acted usefully on an extensive scale; by deviating from the practices of others; by shewing the citizens the error of their notions about yellow fever; the folly of dealing with measures of a marvellous kind for preservation, and the advantages of pursuing natural means, for securing natural ends?

Before leaving Virginia, I was firmly persuaded of the truth of the doctrines which you taught in the University concerning the malignant fever in this country. That it is a disease, the cause of which is generated at home, and not propagated by contagion, is so clearly true, that it is admitted and supported by most of the faculty, who do not oppose the doctrine solely with a view to preserve the favorable opinions of such wealthy and prejudiced persons as employ them: and indeed the doctrine is even rapidly gaining ground among all the citizens. The general desire at this time is, to discover means, not for avoiding importation, but for preventing at home the formation of that something, called miasma, and causing yellow or malignant fever. In the course of your labours, you have strongly recommended the removal of all collections of vegetable and animal matter disposed to putrefy. You have considered that the miasma, or cause of the fevers, was generated during the putrefaction of such substances; and you have taught that the removal of these, that the preserving clean the places frequented by the people, would secure the cities against malignant fever. Unfortunately for the health of the citizens, your advice has been but partially followed, and perhaps it cannot fully be put in practice: for it seems almost impossible to remove all the putrefying masses from the cities, at least while so many persons of careless and filthy habits have so much of their own way.

To me, it appears highly probable, that the continued action of the light of the sun, has more influence in favouring the generation of miasma, than has hitherto been supposed. It has long been known, that in the animal and vegetable kingdoms, it produces most remarkable effects. But few persons are unacquainted with the facts, that the colour of the skins of some animals is materially changed by exposure to light; that by the same means, white vegetables which have grown in the dark lose their whiteness, and have their mildest juices converted into the most active; and that it is in consequence of the strong light within the tropics, that so many plants are spices and are very acrid. Surely these facts are more astonishing, than the production of that miasma by light which excites fevers.

No one will pretend to say that the malignancy of fevers is proportionate to putrefaction. It even seems likely, that the simple putrefaction of bodies, under common circumstances, such as the existence of heat and moisture, is not in reality injurious to men. In all woods, where heat and moisture abound, we know that putrefaction progresses constantly and rapidly; yet persons enjoy in them the best health, particularly in this country. During the unhealthy seasons, in the southern states, it is common, in some places, for gentlemen to remove from their towns and plantations into the thick woods, where they have houses slightly built for their reception: so generally is it known to be safe to reside in shaded places! Lands shortly after they are cleared, are also found to be healthy, although the putrefaction of animals and plants must be immense, from the suddenness of the alteration. It seems almost unquestionable that it is only after *long* exposure to the rays of the sun, that such a species of putrefaction takes place, as is characterized by

the formation of the very active compound, causing the fevers which have lately proved so destructive in some parts of this country.

The theory advanced in my Inaugural Essay, of which you were pleased to express your approbation, led me to form an idea of the manner by which light, was directly instrumental in creating miasma. From the firm conviction of the truth of the position, it was without hesitation that I stated "that the form and properties of all compounds were acquired in consequence of the exercise of the chemical laws or affinities of substances, in the state, condition, or circumstances, in which they were placed"—that of course "any material change of circumstances, was followed by a change of the properties of the substances placed in them," and that we were to learn by experience what particular circumstances were necessary to favour the production of any particular compound.

From the above considerations, I am led to conclude, that such is the peculiar nature of light, when it is strong and long continued, that it creates the particular circumstances in which the particles of putrefying matter of a certain kind, so combine, as to form a compound which acts on men and excites in them malignant and yellow fevers. Should it be asked, why this compound, called miasma, continues to be formed in the autumn, when circumstances are changed by the diminution of light—and what is partly necessary also, heat; the answer is, that such is the constitution or nature of things, that a ferment or chemical change once excited in any part of a mass, has a strong tendency to pervade gradually the whole of it, as is instanced in fermenting fluids, burning materials, and indeed in any body in which an alteration

is wrought in one part before it is in another. When the light has been such, as to create that condition in which miasma is formed over any surface—an idea of it can be conveyed by observing that 'there is a miasmatic state.' By this it will be understood that miasma exists: as the circumstances in which miasma is formed cannot continue, without the formation of it—and indeed the existance of the circumstances can only be ascertained by the appearance of the result, or compound.—Now the way to prevent the formation of such an active substance is to prevent the existence of the circumstances adapted for its formation. Inasmuch, therefore, as we have the power, it should be exercised in diminishing that light—favouring the production of deleterious substances where people dwell.

It might also be stated as generally true—that the activity of the miasma, formed during the putrefaction, is proportionate to the intensity of the light in which the bodies putrefy. Hence in countries where the light is strongest, as in Egypt, the miasma excites the plague; in the towns of the United States, a less violent disease, the yellow fever; and in our counties, only the remittent and intermittent fevers.

In order, therefore, to preserve cities from the terrible epidemics, in addition to your wholesome advice of keeping them clean, by which much disagreeable stench will be avoided immediately, I would recommend shielding them from the action of the sun as well as can be done. Coarse and strong linen made in sheets, could easily be extended from the eves of the houses on one side of the street, to those of the other. These could be so constructed, that they might be readily removed in all boisterous weather. The expense and trouble would not

be comparable to that of paving the streets, as it would require but a little addition to the awnings commonly over the doors of retail stores. But were the expense and trouble ten times as considerable, no man of enterprize and humanity would disgrace himself, by putting such considerations in competition with saving the lives of thousands. In a conversation on this subject, with which I was favoured, with Dr. Miller, he suggested the advantages of having trees of large branches, at least in wide streets, where they would not impede the extinguishment of fires. These certainly must prove of great service; not however, as formerly supposed, by absorbing the miasma, but by preventing the light from favouring its production. Nothing can be more certain, than that some very good effects would be immediately produced if the cities were shaded, at least in some manner more than they now are. The numerous deaths arising, as every one knows, from simple exposure to the sun, and the burning heats created by the reflection of light from the walls, would be avoided; while the labourers would do much more work, as well as the citizens in general, feel much more comfortable. These advantages appear sufficient to justify the adoption of my plan, independently of the fair prospect of preventing yellow fever. This prospect, however, inclines, me to wish most ardently for the remedy; for I believe it will prove successful. Measures less plausible, one would suppose, deserve a trial, for the restoration of that happy state of things, when the citizens will not annually be forced away from the scenes of business; or compelled to see such numbers prematurely consigned to their resting places. To imitate you, in quickening such a restoration, is one among the warmest wishes of

Dear Sir,

Your friend and servant,

THOMAS EWELL.

ELECTRIC FLUID.

The following remarks concerning electricity, were published in my discourses on chemistry, in 1806, in New York. At that time no theory had been published respecting its chemical agency, like heat. Since this, European chemists have adopted and published the doctrine; as is generally the case, not deeming it worth while to acknowledge the American author. As we publish their books, and they suppress ours, they have but little chance of detection.

The doctrine I advanced respecting latent electricity, led me to consider the importance of wearing metallic rings around the wrists and ankles, in cases of delicate health, attended with marks of electricity on the surface. The practice without any rational motive has been common among some people. My friend G. Granger, esq. the late Post Master General, assured me, that he and several of his family derived great benefit from it. The changes in our fluids for latent electricity must be just as great as those for sensible heat, and the one ought to be as much attended to by physicians as the other.

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The various effects proceeding from electricity or lightning, as it is commonly called, are supposed to arise from a fluid which can only be distinguished by such effects. This fluid, like heat, is dispersed over all nature, and has a strong tendency to establish an equilibrium, or be equally distributed over every body. Notwith-

standing this tendency, it is frequently accumulated in considerable quantities, by the operations of nature and art, as all of us know.

The same doctrine that was delivered concerning heat and light, should be extended to electricity. We, therefore, must observe, that some bodies have a *capacity* to unite with it, and render it *latent*, from which state it may be converted into *sensible* electricity, by mechanical and chemical means. When converted in large quantities to the sensible state, it makes its escape so rapidly, as to occasion sometimes the loudest noise or claps, which every one has heard.

It is chiefly by mechanical means, or friction, that electricity is commonly accumulated. By rubbing some substances, it is collected on their surfaces in considerable quantities: and they are called electric bodies. Such substances have, no doubt, a great capacity for electricity; and, in consequence of containing large quantities, readily give a part of it up when rubbed. These are also remarkable for resisting the passage of the fluid; and are consequently called *non-conductors* of electricity, to distinguish them from those favouring its escape, which are called good conductors. The most remarkable of the *non-conductors* of electricity are, amber, glass, sulphur, sealing-wax, silk, feathers, hair and wool. By rubbing any of these briskly on a dry woollen cloth, at night, the collection of the fluid may be readily noticed, by the sparkles which take place. The *conductors* of electricity most remarkable, are the metals. Of these silver, copper and iron, are the best. A moist atmosphere, also, conducts it quickly.

In order to collect the electric fluid, an electrical ma-

chine is used, which being so common, it will be unnecessary to describe. The principles on which it is formed are very simple. By the turning of a round non-conductor, such as a glass cylinder, against silk, the fluid is collected. To prevent its passage to the earth, the machine is insulated, or separated from the surrounding bodies, by being supported on non-conductors, as glass or sealing-wax. It is necessary, however, that the machine be connected to the earth, by a conductor of the fluid, as iron wire, for the purpose of conveying it from the earth to the apparatus. When this machine is made on a large scale, immense quantities of the fluid can be collected in dry weather, and retained some time in glass vessels made for the purpose. From these it is applied to bodies, where it produces great effects. It melts the hardest metals, and decomposes a variety of compounds. In such cases it no doubt operates like light and heat, by creating certain circumstances in which the affinities of particles of matter are exercised. In its passage through the air, it is characterised by the emission of light and heat. These are, in all probability, emitted in consequence of the fluid depriving the air of its capacity for latent light and heat.

It was the great and benevolent Doctor Franklin, of this country, who first discovered that the lightning of the sky is the same as the fluid collected by the above machine from the earth. When it is collected in the clouds, from its tendency to establish an equilibrium, it rapidly escapes to the earth, there producing the flash of light and thunder. The propriety of having conductors of the fluid attached to houses, to convey it from the clouds, must readily appear. Iron rods, tipped with brass or silver at the points, are generally used.

It is well known that the electric fluid, when in considerable quantities, destroys most animals; yet some of them, the torpedo, for example, have the power of collecting it in great quantities, which they emit at pleasure for the destruction of their enemies and prey.

If the doctrine I have delivered concerning electricity be correct; if it unite to bodies and become latent, as heat and light, chemical changes in substances would naturally produce alterations in the capacities of bodies for it, as well as in their capacities for heat and light. Accordingly this appears to be the case in some instances, although generally, the escape of the fluid cannot be detected, as it flies off gradually. Lately, it has been found, to the great astonishment of European chemists, that sulphur (which is electric, or contains a great quantity in a latent state) when melted with copper or iron in a Florence flask, from which all air is excluded, unites to the copper, and appears to burn. About the bottom of the mixture, a sparkle appears which expands over the whole, giving it the appearance of blazing. This sparkling and blaze, no doubt, arise from the escape of the latent electricity of the sulphur, which is set at liberty on its chemical union with the metal. The sparkling of the water of the sea, of red hot metals, and of some other bodies, very probably depends solely on the escape of this fluid. It also appears to me exceedingly probable, that the frequent and great collections of *sensible* electricity in the clouds, noticed during storms, arise from chemical changes in the air, whereby the capacity of the air to retain the latent substance is lost. An union of the air with water, and with other substances, may no doubt produce the changes causing alterations in the capacity of the atmosphere for the latent electricity.

The progress then of the electricity, causing thunder during storms, seems briefly this: in consequence of the great moisture of the atmosphere near the earth, its capacity for uniting to the electric fluid is increased. This air, impregnated with moisture and electricity, ascends in the form of clouds. Some chemical changes occur in this air, in consequence of which, its capacity for heat is increased, and it therefore absorbs the heat of the vapour. The vapour, losing its heat, is converted into water, which falls in the form of rain, or hail; in consequence of the loss of moisture, the capacity of the air for electricity is lost: it is, therefore, converted into sensible electricity, which flies off to be equally distributed, and in its flight deprives the air of its capacity for light, and thereby causes the flash. No doubt other chemical changes may, and do occur in the air, causing the conversion of latent into sensible electricity.

A few remarks concerning Tetanus, Fistulous Ulcers, and a hint respecting the dilatation of the os uteri.

ALTHOUGH I have but very little to offer upon the subjects of tetanus and fistulous ulcers, I have been long anxious to communicate the result of my observations to the faculty which I believe to be well worth their serious attention.

The difficulty of curing tetanus, is too well known to need an account of it in this place; I have never succeeded in curing a single case, although to the very fullest extent I have tried every remedy, which has been recommended by respectable authors. It is not therefore to cure, but to prevent the disease that I write on this subject.

While directing the practice of the Navy Hospital at Washington city, one of the sailors received a blow on his head, and was brought to the hospital. About the fifth day he was seized with symptoms of tetanus rapidly encreasing. The anxiety I felt about this man, was very considerable. It was in the summer season, and I was up very late that night at a window hoisted half way up, through which a strong current of air came against my exposed neck and shoulder. I fell asleep and remained so, for more than an hour, when I awoke with most violent pain in my neck, having the disease called "wry neck," and almost fancying the addition of the "locked jaw." Relief was soon obtained by the application of a hot iron, when it occurred to me, that the general application of the hot iron in tetanus, might prove of service. It was applied with obvious good effect for some time, but the disease returned with encreased violence. After his death a small fragment of the inner table of his scull, was found penetrating the brain.

The next reflection occurring to me, was that the tetanus arose as did the spasm of the muscles in my neck, from exposure to a current of damp air. On inquiry, I found it to be the fact, for he had slept under a half raised window. But for this circumstance, the man I had no doubt would have died from inflammation of the brain.

In consequence of my impressions respecting this case, I resolved not again to allow the risk of such exposures, in all future cases of wounds coming under my care. I had the patients put in the centre of the largest rooms, admitting fresh air from the bottom, at a corner, never allowing any current of it to come near their persons. A good many cases of wounds, as will always occur among such drunken people, were brought into the

hospital, and in the hottest weather. I believe so firmly that tetanus was prevented by the precaution I have used, that I would strongly urge similar treatment. It cannot do harm, and I am sure it has done good.

Surely every physician must admit in cases of wounds, that a quiet state, avoiding any influence from a current of air, must have a strong tendency to promote a healthy action in the sores, and even without reference to tetanus they aught strongly to enjoin the treatment.

My idea of the cause of tetanus is a collapse of the small fibres or pores of the cellular membrane. This might readily be produced by a damp or cold air; and hence it may readily be imagined how a hot iron rubbed over the parts, may excite a new state in them. It is one of the remedies on which I would place much reliance.

Of Fistulous Ulcers.

It has fallen to my lot to meet with a great many cases of fistulous ulcers about the groin and anus, particularly of a venereal nature. My practice in the commencement, was to open them agreeably to the directions of surgeons; and in one case in the hospital, I had to cut a man in various directions, around the groin, perineum, &c. more than twenty five inches. In many cases for months the sinuses would encrease in different directions baffling every attempt to relieve.

Finding in one case the sinus was penetrating inwards and fearing the consequences, I determined to extend Mr. Potts's plan of treating carious spine, to this complaint. The lunar caustic was not powerful enough to

keep up ulceration on the skin; and as I was apprehensive of the irregular action of caustic alkali and lime, I determined to apply blisters, and keep them running on the surface until the granulations underneath rose to the surface. The relief obtained, was truly surprising. The blistering ointment was applied to the inflamed sides, and renewed there daily, for a few hours, till a discharge was excited. It is a fact, that after the introduction of these blisters in this way, not another case of sinus occurred out of the many buboes, subsequently treated. I never could disperse a buboe, by blisters, as recommended by Mr. Hunter, but always found that their application tended to lesson the extent of the deep seated affections. My object however in writing this, is simply to state the fact, of treating the edges and surfaces of the sinuses with daily blisters, until all cavities underneath, are closed; and the communication of this result of experience will be valued highly by all physicians, who may derive one fourth of the benefit in their practice, which it has afforded me.

I could never account for the excessive tendencies of the parts between the thighs, to become fistulous, until forcibly impressed with the enormous secretions of their skin always daily increased by exercise. In sores of these parts, we are obliged to keep quiet, and consequently the ordinary secretion does not take place, and the cellular membrane underneath becomes diseased. The effect of the blister on the surface, bringing out the secretions distending and inflaming underneath, presents a very rational prospect of cure.

I have not had much experience in applying blisters around the anus. But the relief derived elsewhere from them, induces me to lay it down as a rule, wherever

there is much cellular membrane which is so liable to become fistulous, in every case of disease underneath—*blister daily till relief is afforded.*

Of the refusal of the os uteri to relax.

There are cases daily occurring in which the uterus contracts, while its orifice refuses to open for the passage of the child. Dr. Dewees has published an Essay on lessening the pains of labour in which he strongly enjoins free and sudden bleeding, a remedy I have used with like success. But there are cases where such large bleedings may be dangerous. We have in the Ergot a powerful medicine which causes the uterus to act; but not always the dilatation of its mouth. Some time ago having witnessed the effects of the Jamestown weed in causing the dilatation of the anus, I conceived that it might have the same effect applied to the os uteri. Apprehensive that it might produce deleterious effects on the human uterus, I sought an opportunity to apply it to the lower animals. I applied a strong decoction of it to the edges of the womb of a bitch and a sow while in labour, without producing any bad effect; of course their labour was natural. No case of the refusal of the os uteri to dilate has occurred to me in practice; but if it should, and moderate bleeding did not succeed, I would propose the application, explaining its nature to the patient and her friends. I would try at first a very weak decoction of it, dipping a cloth or sponge in it, and apply it to the mouth of the womb for a short time, occasionally repeating it; with the confidence that it must tend to relax the part. I need not add any cautions respecting the too free use of it; all must know that too

great care could not be taken, as it ranks among the most deleterious poisons. Nevertheless for those who will be particular, I will add, for their encouragement to make a fair trial, that I have seen ten times the ordinary dose of this medicine taken in the stomach by accident, producing only dilatation of the eye, and a very short delirium, without any other bad symptom.

A decoction of tobacco has been injected in these cases, without producing any good effect. I should have supposed this to have been the result, as tobacco operates too much on the general system. That the Jamestown weed, will act locally is fully proved by its application to the eye, producing a dilatation of the pupil, without affecting any other part.

THE END.