

Medical extracts. Being a concentrated view of some late discoveries in chemistry, and the new theory and practice of physic, thereby introduced / By a friend to improvements [i.e. R.J. Thornton].

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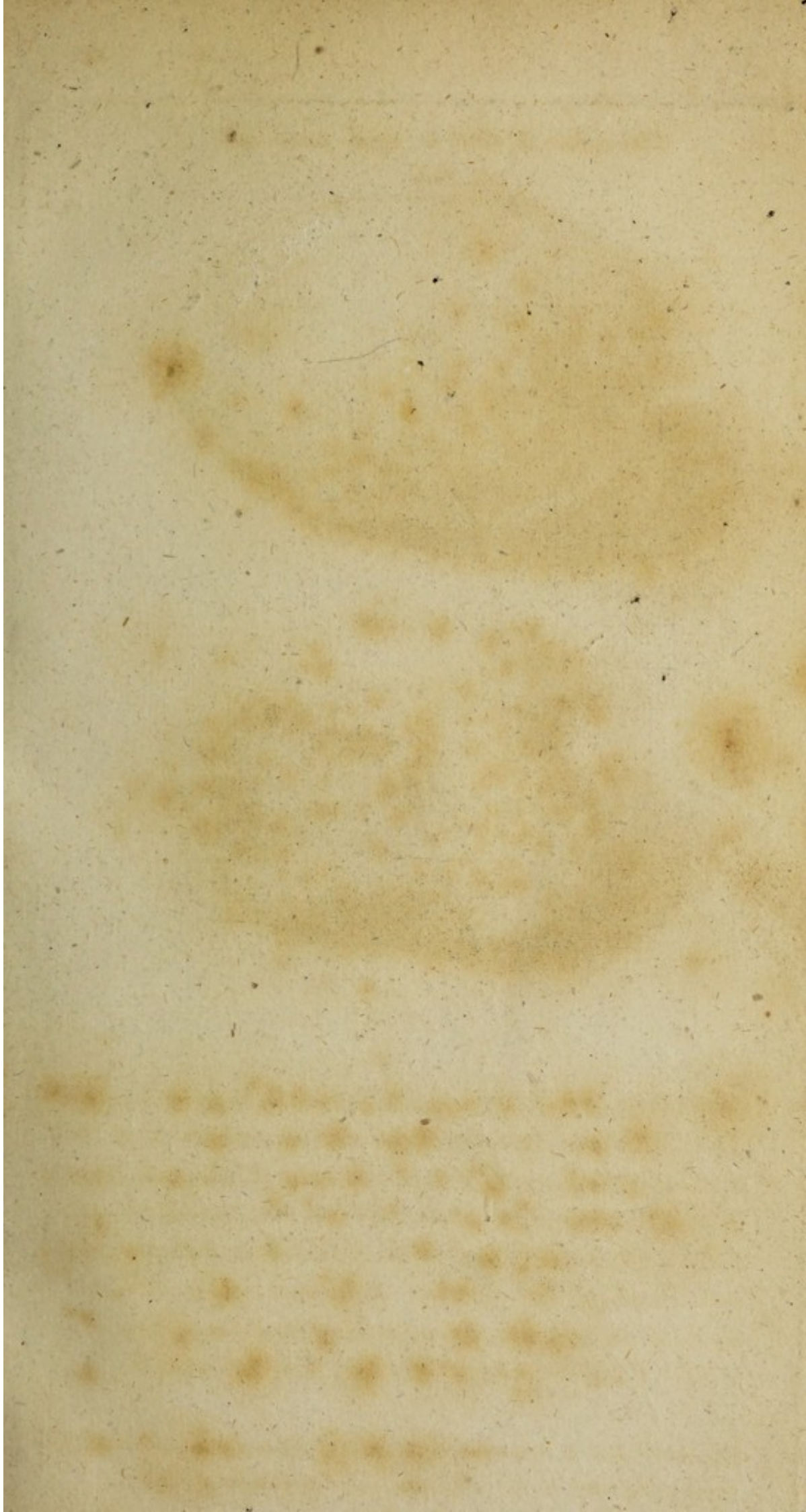
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This refers to what is said page 49.

1st State.



2^d State.



Mr Underwood took Mr^s Stephens's Solvent for the stone Six months, during which time he voided many flakes and pieces of Stone. He died March. 1. 1739. I took out, says Mr. Sharp, the Surgeon, from Mr Underwood, a stone, that had the appearance of being much wasted, most of the Shell being destroyed, and very much of the internal Substance eaten into, so as in some measure to resemble a carious bone.

The bladder was in a very healthy state.

You have here a representation of this Stone in its 1st State, as supposed, and in its 2^d state, as actually found.

1.

MEDICAL EXTRACTS.

BEING
A CONCENTRATED VIEW
OF SOME
LATE DISCOVERIES IN CHEMISTRY,
AND THE
NEW THEORY AND PRACTICE OF PHYSIC,
THEREBY INTRODUCED.

BY
A FRIEND TO IMPROVEMENTS.

There are three things which almost every person gives himself credit for understanding, whether he has taken any pains to make himself master of them or not. These are, 1. The art of mending a dull fire: 2. Politics: and, 3. *Physic*. FROM DR. BEDDOES'S GUIDE TO PARENTAL AFFECTION.

L O N D O N :

Printed for ROBINSON, Paternoster-Row :

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MURRAY, Fleet-street; OWEN, Piccadilly, opposite Bond-street;
and Cox, St. Thomas's-street, Borough.

1794.

MEDICAL EXTRACTS

1890

A COMPANION TO THE

OF THE

PHARMACEUTICAL

AND

NEW THEORY AND PRACTICE OF MEDICINE

THEORY IN PRACTICE



2.

TO

SIR JOSEPH BANKS, BART.

President of the Royal Society, &c. &c. &c.

SIR,

As a Patron of the Liberal Sciences; and more especially, from the native benevolence of your disposition, as the favourer, of every attempt that may tend to alleviate the afflictions of mankind, this work is humbly offered to your notice.

It places in a concentrated view, the late discoveries in chemistry, and the new theory and practice of physic.

The late Dr. HUNTER ventured to prophesy, *that if ever THE OFFICE OF THE LUNGS should be discovered, there would arise a great and sudden improvement in the science of medicine.*

This discovery, Sir, has been made, to the honour of the 18th century, by the fortunate labours of several philosophers; and a new doctrine, grounded, in part, upon the knowledge of *the office of the lungs*, and *the agency of oxygen air in the system*, is instituted by Dr. BEDDOES, the learned and ingenious Professor of Chemistry at OXFORD, which unfolds the causes of many hitherto perplexing disorders, and at the same time suggests to the enlightened practitioner a rational and improved mode of treatment.

Though no open objections were made to this new improvement in the science of medicine by any physician, yet some insinuations appear to have been early thrown out, complimentary indeed to the ingenuity of Dr. BEDDOES, but exhibiting a strong prejudice against any alteration even in the unsuccessful routine of practice.

These

These attempts only served to call forth the pens of men of the highest respectability, and Dr. DARWIN, Dr. PERCIVAL, Dr. WITHERING, Dr. PARRY, Dr. EWART, Dr. WOOD, Dr. BRIGGS, Dr. THORNTON, and even the pupil and favourite of the late Dr. CULLEN, the Rev. Mr. TOWNSEND, did not hesitate, with the Rev. Mr. CARTWRIGHT, to deliver to the public their unbiassed testimony in favour of the new practice*.

The office of the lungs being known, and the alteration of the blood from oxygen air, and the influence of oxygenated blood on the nerves and animal œconomy,

* Vide the Communications of several of these Gentlemen, as published by Dr. BEDDOES: also Dr. PERCIVAL's Essays; Dr. WOOD's Cure of Typhus, or Putrid Fever, by Oxygen Air; and the Rev. Mr. TOWNSEND's Physician's Vade Mecum.

The public will see these new opinions also amply vindicated by Dr. DARWIN, in a work of his, which will be published in a few weeks; and in the Rev. Mr. TOWNSEND's Guide to Health, now in the press. We are also in expectation of another work from Dr. BEDDOES on this subject.

the study of phyfic is now become a pleasing and interesting pursuit. Nature appears sublime and simple in her operations. The great mystery of life is laid open to our view, and we are enabled clearly to comprehend, how this wonderful machine of ours depends every moment for its existence on the due supply of *oxygen air* to our lungs, displaying at once the wisdom and benevolence of THE ALMIGHTY. Having learnt this intimate connection, we see the grounds for the *new practice*; and from the exertions of physicians educated in the *new school*, we are led to entertain some hopes of seeing even those recovered, who have already been despaired of by their friends. We are taught, also, how to avoid many common and afflicting disorders incident to the human frame; and, thanks to Dr. BEDDOES, who stands confessedly the foremost of the new school, the way to a prolongation of life and health, comparatively speaking, is made easy:—and if the execution of this work has at all corresponded

responded with the intention of the author, persons of both sexes, who have the power of fixing their minds for a few hours, and feel themselves interested in the important enquiry, will soon be initiated into the new discoveries of chemistry, and the new theory and practice of physic, thereby introduced.

The labours of many enlightened physicians are here presented in one body, and by notes, and some alterations in the text, and a methodical arrangement, it is hoped, they are rendered intelligible even to such as have not been accustomed to studies of this kind. As a just tribute of respect and esteem,

I have the honour to subscribe myself,

Sir,

Yours, &c. &c.

responded with the intention of the author, per-
sons of both sexes, who gave the power of living
their minds for a few hours, and had themselves
inserted in the new system, and will soon be
initiated into the new system of chemistry,
and the new theory and method of physics, that
by means of which the human mind will be able to

The subject of human philosophy
are here presented in one body, and by means
and more extensive in the text, and a methodical
arrangement, it is hoped, they are rendered in-
teresting even to such as have not been ac-
customed to studies of this kind. As a guide to
those of respect and others.

I have the honor to subscribe myself,

Yours, &c.

SECT. I.

THE MECHANICAL PROPERTIES OF AIR.

ONE of the first things that our senses inform us of, is, that although THE AIR we breathe is too fine for our *sight*, it is very obvious to our *touch*. Although we cannot *see* the *wind* contained in a bladder, we can readily *feel* its resistance; and though the *hurricane* may want *colour*, we often fatally experience that it does not want *force*. So far the slightest experience reaches; but by carrying experiment a little farther, we learn that *the air* also is HEAVY.

A glass vessel being *emptied of its air* and accurately weighed, has been found *lighter* than when it was weighed with the air in it. Upon computing the *superior weight* of the full vessel, a *cubic foot of air* is found to weigh *rather more than an ounce*.

Again, if the air be exhausted out of any vessel, and this vessel be set with the mouth downwards in water, the *water will rise up* into the empty space, and fill the inverted glass; the external air will in this case press upon the water surrounding the glass, and force it up into *the vacuum*; and just as the beam of a balance *rises*, the other extremity having a weight on it, so will the

water *rise* in the glafs, and continue *to rise* (if the empty glafs were tall enough) 32 FEET, and NO HIGHER *.

Pipes have been made purposely above 32 feet high; in which, upon being exhausted, the water has always risen to the height of 32 feet: there it has *constantly rested*, and *never ascended higher* †.

From this fact we learn therefore the EXACT WEIGHT of *the air*, which pressing up the water 32 feet, is equal to a column of water of that height, as it is just able to raise such a column, and no more.

In other words, the surface of the earth is every where surrounded with a *weight of air*, which is *equivalent* to a flood of water 32 feet deep, or to a covering of 29 inches and an half of quicksilver, which is known, though occupying less space, to be just as heavy as the former ‡.

Thus we see that the air at the surface of the earth is just as heavy as 32 feet of water, or 29 inches and an half of quicksilver; and it is easily found that to raise water 32 feet, *will require a weight of 15 pounds upon every square inch*.

* It is on this principle that *pumps* raise water.

† Pumps, therefore, raise water no higher than 32 feet.

‡ *Barometers* which determine the weight of air are constructed on this principle.

Now

Now if we are fond of computations, we have only to calculate *how many square inches* are in the *surface* of an ordinary human body, and allowing *every inch* to sustain 15 *pounds*, we may amaze ourselves at the weight of air we sustain.

It has been computed that our *ordinary load*, though from its *equal pressure* we are not sensible of it, amounts to within a little of 20,000 *pounds*: this is wonderful! but it is not by wondering we acquire wisdom.

Notwithstanding this be our ordinary load, there are at *different times*, as the barometer shews†, *some variation*.

The air is not equally heavy at all seasons; but sometimes it is *lighter*, and sometimes *more heavy*. This, therefore, makes a *very great difference* in the weight we sustain; and we are actually known, by computation, to carry at one time 4000 pounds of air more than at another.

† When the barometer *rises*, a greater weight of air presses up the mercury in the tube, and the clouds usually ascend; when the barometer *sinks*, the weight of incumbent air being less, the clouds gravitate below. Hence the *variations* of the barometer denote the *changes* of the weather. The effects of a *moist* or *dry* air, and the vicissitudes of *cold* and *hot* winds on the animal body, will be considered afterwards.

Again, as in the sea, a man at the depth of 20 feet, sustains a greater weight of water than a man at the depth of but 10 feet; so will a man at the bottom of a deep valley have a greater weight of air over him, than a man at the top of a very high mountain *.

Our constitutions seem also to correspond with these changes; they are braced, strong, and vigorous, with a *large body of air* upon them;—they are languid, relaxed, and feeble, when *the air is light*, and refuses to give our fibres their proper tone.

* The art of taking the heights of mountains by the barometer determines this curious point. As the air grows *lighter* the higher we ascend, the fluid in the tube will *sink* also in due proportion. It is found to *fall* at the rate of the tenth part of an inch for every 90 feet; so that in going up a mountain, if the quicksilver has fallen *an inch*, I conclude I am got up an ascent of near 900 feet. GOLDSMITH.

SECT. II.

THE CHEMICAL PROPERTIES OF AIR.

FORTUNATELY for my readers, the chemical knowledge necessary first to be learnt in order *clearly* to understand the INFLUENCE of the AIR on the BLOOD, and THENCE on the ANIMAL ECONOMY, comprises the *most beautiful discoveries* in that science ; *discoveries* that have done honour to this age, and have immortalized the names of PRIESTLEY, LAVOISIER, FOURCROY, and CAVENDISH.

The Honourable Mr. BOYLE has considered OUR ATMOSPHERE as *one large chemical vessel*, in which an infinite number of various operations are constantly performing. In it all the bodies of the earth are continually sending up a part of their substance, by evaporation, to mix in *this great alembic*, and to float a while in common. Here minerals from their lowest depths ascend in noxious vapours to make a part of the general mass; seas, rivers, and subterraneous springs, furnish their copious supplies; plants receive and return their share; and animals that by living upon consume this general store, are found to give it back in vast quantities when they die.

THE

THE AIR, therefore, which every where presses on us, and upon which we subsist, bears very little resemblance to that *pure, simple, elementary body* formerly imagined; and which is rather a substance that can be conceived, than experienced to exist.

MODERN CHEMISTRY, however, has made great advances in *this curious research*, and it will soon appear that the composition of atmospherical air has been more *rigorously* determined.

Chemistry affords two general methods of ascertaining the constituent principles of bodies, the method of ANALYSIS*, and that of SYNTHESIS†.

When, for instance, by combining *water* with *alcohol*, we form the species of liquor called BRANDY, we certainly have a right to conclude (by this synthesis) that BRANDY is composed of *alcohol* and *water*.

And when by distillation of BRANDY, we obtain separate, *water*, and *alcohol* (by this analysis), our evidence of the constituent principles of BRANDY is then rendered complete; and in general it ought to be considered as a *principle* in chemical science, never to rest satisfied without *both these species of proofs*.

* From the Greek word αναλυσις. The separation of any compound into its several parts.

† From the Greek word συνθεσις. The putting together the several parts of a compound body.

THE MODERN ANALYSIS

OF

ATMOSPHERIC AIR;

Or its Separation into } The ONE supporting Life and Flame.
 2 ELASTIC FLUIDS, } The OTHER adverse to both.

LAVOISIER'S EXPERIMENT.

THIS illustrious chemist having placed a certain quantity of MERCURY in a *retort*, adapted to a *bell glass*, which enclosed 100 *cubical inches* of COMMON AIR, he kept up in his furnace a constant fire, of such force, as to keep the QUICKSILVER almost always at its *boiling point*.

On the second day small RED PARTICLES began to appear on the surface of the MERCURY, which gradually increased in size and number for 4 or 5 days.

Convinced that the *calcination* of the MERCURY after that time did not go on, he extinguished the fire; and when the vessel was cool, he found in his bell-glass, instead of 100 *cubical inches of air*, only 86, and therefore A LOSS of 14 *cubical inches of AIR*.

Now,

Now, 14 *cubical inches* of AIR weighs 7 *grains*, and the RED PARTICLES, OR CALX OF MERCURY, being carefully collected, *these* had an *increase of weight* of 7 *grains*, the *exact weight* of AIR which seemed LOST*.

The 86 *cubical inches* of AIR remaining in the glass after this calcination was ended being examined, it was found to possess THESE PROPERTIES.

An animal being put into it was *suffocated* in a few minutes,—and when a *taper* was plunged into it, it was *extinguished*, as if it had been immersed in water†.

THIS GAS, OR AIR, has been called *phlogisticated air*, *non-respirable air*, *noxious or mephitic air*, *impure air*; but the French chemists have preferred the term AZOTIC GAS (*lethal air*) from the Greek words α , *privative*; and $\zeta\omega\eta$, *life*.

* The conclusion is obvious, and in the next experiment, we shall find, that the 14 *cubical inches of air*, which was *absorbed* by the MERCURY, and converted it to a CALX, was the *vital or respirable part* of air.

† Not from any peculiar properties, but because the *vital or respirable part* was abstracted from it.

LAVOISIER'S SECOND EXPERIMENT.

HAVING taken 90 *grains* of the CALX OF MERCURY*, the product of the *last process*, LAVOISIER put it into a glass retort fitted to a proper apparatus for receiving aerial products.

Having applied a *much stronger heat* than in the last experiment, he observed that at first, in proportion as the CALX OF MERCURY became heated, the intensity of its colour augmented; but soon after, the CALX began gradually to decrease in bulk, and in a few minutes *its red colour altogether disappeared*, and the CALX was converted into RUNNING MERCURY, and 14 *cubical inches* of an AERIAL FLUID passed over into the recipient.

Now these 14 *cubical inches* of air weighed 7 *grains*, the *exact weight* of the air *consumed* by the CALCINATION of the MERCURY in the first experiment †; and the calx of mercury REDUCED ‡ to a metallic state being exa-

* Corrosive sublimate.

† Had the 100 *cubical inches* of atmospheric air contained a larger share of oxygen or *vital air*, more MERCURY would have been calcined. For calcination, as this experiment shews, is nothing more than the combination of *respirable air* with any metallic body.

‡ From the Latin word REDUCO, *to bring back*. REDUCTION is the bringing back a metal converted to a calx to its *pristine state*.

mined, had *lost in weight* 7 grains, the *exact weight* of the air obtained. THIS AIR possessed these PECULIAR PROPERTIES.

An animal, being placed in IT, became remarkably lively; a *taper* burnt in it with a *dazzling splendour*; and *charcoal*, instead of consuming quietly away, as it does in common air, burnt *with a flame*, attended with a decrepitating noise, and threw out such a *brilliant light* that the eyes could hardly endure it.

This species of air was discovered almost at the same time by Dr. PRIESTLEY, Mr. SCHEELE, and LAVOISIER. Dr. PRIESTLEY* gave it the name of *Dephlogisticated* or *Pure Air*; Mr. SCHEELE called it *Empyreal Air*; and LAVOISIER first named it *Highly respirable Air*, or *Vital Air*; and afterwards, as it forms acids, by com-

* Dr. PRIESTLEY is, however, believed to have been the *first* who discovered this *wonderful aerial gas*, but undoubtedly LAVOISIER was the *first* who proved, by direct and exact experiments, that the weight which metals gain by *calcination* corresponds with that of the air which they absorb; he was the *first* who published that the atmosphere consists of *two distinct fluids*, the *one* fit for the purposes of respiration and combustion, which he therefore called VITAL, or PURE AIR; the *other* unfit for either purpose, and thence called FOUL, or MEPHITIC AIR; he *first* proved that PURE VITAL AIR contained more FIRE, or CALORIC, than any other air; and that during combustion, as this air, or rather its *base*, was uniting to the substance, and adding its weight to the burning body, it gave out THIS FIRE in the form of HEAT and LIGHT. *Kirwan.*

binning

II

binning with certain bodies, the French chemists adopted the term OXYGEN GAS (*Acid-making Air*), from the Greek words *οξύς*, *sour*; and *γεννᾶναι*, *to beget* *.

* If *sulphur* or *charcoal* be burnt in *oxygen* or *vital air*, in a close vessel, and the fumes be condensed in water, *this water* will acquire an ACID TASTE, and be increased in *weight* exactly *corresponding* to the *weights* of *sulphur* or *charcoal* consumed, and *that* of the *oxygen air* destroyed. *Sulphur* united thus with *oxygen*, the fumes being collected in water, will form VITRIOLIC ACID; and *charcoal* combined with *oxygen*, and diffused in water, will form SELTZAR, or the AERIAL ACID WATER. The *calces* of metals the French chemists call OXYDS, which signifies a body impregnated with a *certain quantity* of *oxygen*, but not *sufficient* to render it *perceptibly acid*.

THE SYNTHESIS.

LAVOISIER then repeated the same experiments as before related, and *re-combined* the 2 ELASTIC FLUIDS, which he had separately obtained in the two experiments of *calcination* and *reduction*, viz. the 84 *cubical inches* of the AZOTIC AIR, and the 14 *cubical inches* of the OXYGEN AIR, and he produced from *this combination* an ELASTIC FLUID *precisely similar in all its properties* to ATMOSPHERIC AIR, contributing in the same way to a repetition of the same experiments, and possessing the same power of supporting animal life and combustion.

The philosopher can have no remaining doubt as to the *composition* of ATMOSPHERIC AIR: but the circumstances of these experiments might appear to him *more correct*, though probably at the time *less clear* to others, were it said, that MERCURY, at a certain temperature, overcoming the affinities * of *caloric* † and *azotic air* for
OXYGEN,

* If you take a bullet and divide it with a knife into *two parts*, provided these be smooth and rubbed together, they will strongly unite and form *one whole*. This is from a law impressed on matter called the *attraction of cohesion*. But should a particle of sand, or any roughness exist, the particles being divorced

† Fire, or the matter of heat.

OXYGEN, attracts and fixes within itself OXYGEN *, (the *base* of oxygen air, for oxygen air is oxygen combined with a certain quantity of caloric :)—hence its *increase of weight*, and its *conversion into an oxyd or calx*, and hence the AZOTIC, OR LETHAL, AIR *left us* in the bell-glass.—That, the temperature being increased †, the affinity of

divorced from each other, beyond the *sphere of mutual attraction*, they are no longer actuated by this law.—The *attraction of cohesion* in mercury, at the common temperature, hinders the admission of OXYGEN, for which it has an *elective attraction* or *affinity*. But when exposed to a strong heat, the *caloric* expands this fluid ; that is, insinuates itself through the body, and separates its particles (thermometers depend on this expansive power of fire), and, like the pieces of the bullet where sand interposed, the divided particles are no longer subject to the *law of cohesion* ; then it is they obey the *law of attraction*, and each atom of MERCURY *attracts to itself* a particle of OXYGEN, just as a loadstone would draw to itself a particle of iron.—The loadstone *only attracts* iron. This represents the term *affinity* in chemistry. The mercury did not attract the AZOT, because chemists would say it had no *affinity* for it.

* An experimentalist would illustrate this by placing a NEEDLE between *two magnets* of different powers. This would represent OXYGEN between the two attractions of the *caloric* and *azotic air*. As we may suppose a *loadstone* to have an attraction for the NEEDLE superior to the *two magnets*, so would it draw THE NEEDLE to itself from *these*, just as the *mercury* draws away from the *azotic air* and *caloric*, the OXYGEN.

† This is a curious fact ; the temperature being increased, the CALORIC alone overcomes the *elective attraction* of *mercury* for *oxygen*, and depriving it of *that principle*, the *attraction of cohesion* takes place with the particles of *mercury*, and we obtain then RUNNING MERCURY and OXYGEN GAS. To have recourse to the note on page 12, the *oxygen* and *mercury* being separated beyond their *sphere of attraction*, the *caloric* attracts to itself the *oxygen*, just as either of the *magnets* (in the preceding note) would again attract to itself the NEEDLE, were it placed within its *sphere of attraction*, but *beyond that* of the *loadstone*.

the

the *caloric* for OXYGEN becoming now superior to the attraction of the MERCURY, the OXYGEN is withdrawn from the OXYD OF MERCURY by the superior attraction of the *caloric*;—hence its *decrease in weight*, and its *restoration to fluidity and splendour*, and hence the produce of OXYGEN, or VITAL, AIR, clearly displaying to us this important truth,

“ THAT ATMOSPHERIC AIR IS ACTUALLY A
 “ COMPOUND OF TWO HEAVY SUBSTANCES, AZOT *
 “ AND OXYGEN; WHICH BODIES, WHEN COMBINED
 “ WITH CALORIC, OR THE MATTER OF HEAT, BE-
 “ COME AERIFORM, AND ARE THEN AZOTIC AND
 “ OXYGEN AIRS.”

Although these experiments furnish us with a very simple means of obtaining, separate from each other, the two elastic fluids which compose our atmosphere, yet do

* That AZOT is a *solid substance* as well as OXYGEN, can be easily proved by experiment. That the application of heat should render *oxygen*, and *azot*, *gaseous* is not wonderful, since we often observe *ice* by the admixture of *caloric* rendered a *fluid*, and heated to 212, converted into an aeriform and transparent gas. The hardest substance in the world, the DIAMOND, may be volatilized in the same way. Mon. D'Arcet took a sphere of porcelain china, and after cutting it into halves, confined a *diamond* in the middle; he then joined the two sections strongly together. Putting these balls into a furnace, he afterwards unscrewed them, and found the diamonds evaporated, and the place which they occupied empty, though he could perceive no chink or fracture any where over the surface of the ball!

they

they not give us an exact idea of *the proportion* in which *these two* enter its composition *. For the attraction of the MERCURY for OXYGEN is not sufficiently strong to overcome all the circumstances which oppose this union, such as the mutual adhesion of the *oxygen* and *azotic airs*, and the strong affinity which unites *oxygen* to *caloric*, in consequence of these, though the OXYGEN is torn by the MERCURY from its union with the *azotic air* and the *caloric*, yet towards the end, when the *azotic air* is more abundant, there will still remain some portion of the *oxygenous principle*, combined with the *azotic air*, which the MERCURY could not separate.

* In our climate the proportion generally is 4 of *azotic air* to 1 of *oxygen air*, as will be hereafter proved.

THE ANALYSIS
OF
OXYGEN AIR.

THAT OXYGEN GAS, is composed of { OXYGEN,
HEAT,
& LIGHT,

will be *evident* from the following very elegant experiment made by Dr. INGENHOUST.

A fine *iron wire*, twisted into a spiral *, being heated at its extremity red hot, and thrust into a jar containing only *oxygen air*, it instantly took fire, and burnt away rapidly †, exhibiting a bright light similar to that of Chinese fire-works, and throwing out brilliant sparks, which fell to the bottom in the form of round globules ‡.

At the beginning of the combustion there is a slight augmentation in the volume of the air in the bell-glass, from the dilatation caused by the heat; but presently

* This was done to render the experiment more striking.

† This experiment shews that *azotic air* retards the union of *oxygen* with bodies attracting it, and in some cases altogether prevents it.

‡ These were found floating on the mercury, and are natural *Martial Æthiops*. How much slower is the *calcination* or *rusting* of *iron* in other circumstances!

after a *rapid diminution* takes place, and *the mercury rises in the glass*, inasmuch that when the *quantity of iron is sufficient*, and the *AIR operated on is very pure*, almost the *whole air employed is absorbed**,—or should the *quantity of IRON be insufficient*, the *REMAINING AIR unabsorbed* will be found *PERFECTLY PURE*†.

The *theory* of this experiment is the same as the last. At a certain temperature *IRON* has a *stronger affinity* for the *OXYGEN*, than *CALORIC* and *LIGHT* have. It *therefore* attracts to itself the *OXYGEN*, and *CALORIC* and *LIGHT* becoming disengaged‡, are rendered *active* and *evident* to the senses.

Previous

* That is, if 100 grains of *IRON* be consumed in 70 cubic inches of *oxygen air*, the whole volume of air will disappear; and as 70 cubic inches of *oxygen air* weigh 35 grains, the 100 grains of *iron* will weigh, in its state of *oxyd* or *calx*, 135 grains.

† As the *pure* or *oxygen air* is found unaltered, the *mephitic air* left us in the *calcination of the mercury* could arise only from the *abstraction* of the *oxygen air*. Vide Experiment the First, p. 8. Note *.

‡ As the *calcination* of the *mercury*, in the first experiment, lasted several days, the *disengagement* of *CALORIC* and *LIGHT* was extremely small for each particular moment of time, and therefore not perceptible to the sight. The heat, also, of the furnace was confounded with it, which made it necessary to relate the experiment above, where the *combustion* of the metal was more rapid, or rather the *decomposition* of the *OXYGEN GAS*.

When we are sailing on the water in a still day, *distant objects appear to meet us*, but our reason corrects the delusion. When we behold the sun, moving from east to west, philosophy again assumes its empire, and we are convinced

Previous to our entering upon the subject of the effects of air on the animal economy, it will be necessary to shew, also, that WATER, though it be the solvent of a vast variety of bodies, is neither that *compound* or *simple element* formerly supposed, but made up of two VERY DISTINCT and DIFFERENT PRINCIPLES.

The new and beautiful doctrine of the French chemists, respecting the composition of air, the nature of combustion, calcination, &c. was daily gaining ground, and obtaining the applause of every one, when an experiment performed by Dr. PRIESTLEY made it for a while totter on its basis.

In the middle of a long glass tube this excellent experimentalist put some CALCINED LEAD, and affixed to the extremities *bladders* which were filled with INFLAM-

it is *stationary*. If we take a PRISM, it displays to us a variety of colours; our reason tells us here also, that *these colours* arise from the RAYS OF LIGHT, and are not *in* THE PRISM,—so of the combustion of bodies, the *caloric* and *light* are not from THE WAX of our candles, but from the OXYGEN AIR, which, as we have seen in this experiment, becomes, under certain circumstances, *decomposed*. Vide also the latter part of note †, page 24.

MABLE

MABLE AIR*. Having applied a strong heat to the middle of this tube, he next squeezed the bladders, and forced the INFLAMMABLE AIR along the tube.

The INFLAMMABLE AIR soon disappeared: no OXYGEN GAS was evolved: but the RED LEAD quickly *re-assumed* its original metallic splendour.

A question then arose, whence *this property* in INFLAMMABLE AIR which the ANTIPHLOGISTIANS would ascribe to the evolution of OXYGEN GAS.

The favourers of the NEW SYSTEM were not able to deny the fact; and as the INFLAMMABLE AIR, which was now called PHLOGISTON, had in this experiment *disappeared*, they found some difficulty to persuade *the supporters of the OLD DOCTRINE* that the *revival of the metal* could not be from the *absorption* of the INFLAMMABLE AIR, as the RED LEAD had *lost* a good deal of its *weight*,

* *This air* Dr. PRIESTLEY obtained from *diluted* vitriolic acid poured on iron. *Iron* was therefore said to contain a great quantity of *this air*. But the fact will soon appear that the air arose from *the decomposition of the water* mixed with the vitriolic acid. INFLAMMABLE or HYDROGEN AIR, being 15 times lighter than common air, it is employed for balloons.

Inflammable air quickly destroys life, whereas *oxygen gas* appears to be the very principle of life. *It* is considerably lighter than either *oxygen* or *common air*. *It* explodes when it comes into contact with *common air*, but more especially with *oxygen air*, provided any body in actual inflammation be present.

and the *effect* of an *addition of matter* (if *inflammable air* be *matter*) could be no other than to give it an *increase of weight*.

Fortunately for chemistry the Honourable Mr. CAVENDISH, by passing an electric shock through *oxygen air* blended with *inflammable air* †, produced WATER. The *reduction* of the RED LEAD in Dr. PRIESTLEY's experiment was then no longer a matter of surprise. At a *certain temperature* the INFLAMMABLE AIR overcoming the attraction of the *lead* for OXYGEN divorced it of *that principle*, and uniting with it formed WATER.

But that no doubt may be entertained on this head, I must beg leave to relate an experiment which was performed by MEUSNIER before a large assembly of the Academy of Sciences at Paris.

† 85 grains, by weight, of *oxygen air*, and 15 grains of *inflammable* or *hydrogen air*, produced here precisely 100 grains of WATER. In this experiment *caloric* is disengaged, and the 85 parts of *oxygen* and 15 of *hydrogen* unite, which, being naturally *solid substances of themselves*, become, if nearly all the *caloric* be extracted from them, ICE; if less, WATER.

THE ANALYSIS

OF

WATER;

Or its separation into its $\left\{ \begin{array}{l} \text{HYDROGEN, and} \\ \text{2 CONSTITUENT PARTS, } \end{array} \right. \text{OXYGEN.}$

MEUSNIER'S FAMOUS EXPERIMENT.

HE took a GUN-BARREL, into which he put some thick pieces of IRON-WIRE flattened by the hammer. He *weighed* the whole with a scrupulous exactness. He then *luted* the gun-barrel to secure it from the immediate contact of the fire. It was then placed in a *furnace*, but so *inclined* that water would readily glide down it. He adapted to the upper extremity a *funnel* containing water, from which it could not escape into the gun-barrel but drop by drop. This funnel was *closed at the top* to avoid any the least evaporation of the water. At the lower extremity *vessels* were adapted to receive any aerial product. To use every precaution *these* were exhausted of their air.

The

The *gun-barrel* was now made red hot, and the WATER from the funnel passed into it drop by drop.

An astonishing quantity of INFLAMMABLE AIR* was quickly obtained.

Having removed the luting, the *gun-barrel* with its contents weighed considerably *heavier* than *before*; and the *acquired weight* of the *gun-barrel* being *added* to the *weight* of the *inflammable air* thus produced, was *precisely* the *weight* of the WATER expended in the process: and the IRON-WIRE found in the barrel (the process being over) resembled in every respect *iron* that has been consumed in *oxygen air*, that is, it was become an OXYD† OF IRON.

Before we enter upon the main object of this work, it will be necessary also to give the analysis of FIXED AIR.

* This INFLAMMABLE AIR was generated from the *hydrogen* of the water, which united with the *caloric* of the furnace in its passage through the barrel. INFLAMMABLE AIR the French chemists call HYDROGEN GAS, from the Greek words *υδωρ* water, and *γεννομαι* to beget.

† A CALX, which accounts for the *oxygen*, the other constituent principle of WATER.

THE ANALYSIS

OF

CARBONIC ACID AIR, OR FIXED AIR;

Or its Separation into its $\left\{ \begin{array}{l} \text{CHARCOAL, and} \\ \text{2 CONSTITUENT PARTS, } \end{array} \right. \text{OXYGEN AIR.}$

MR. TENANT, of Emanuel College, Cambridge, having procured a glass tube hermetically sealed at one end, luted it over with clay and sand to prevent the sudden action of the fire. He then introduced into it some PHOSPHORUS and powdered MARBLE*, and having closed the open extremity, he applied to the tube a quick heat, and the result was, when cold,

1. PHOSPHORIC ACID† combined with *calcareous earth*.
2. PHOSPHORUS combined with the *same earth*. And
3. A BLACK SUBSTANCE, which differed in nothing from CHARCOAL made from vegetables.

* If *vitriolic acid* be poured on *marble*, FIXED AIR is given out in great abundance. Mr. Tenant therefore assumes this data, *that marble contains FIXED AIR*. As the residue is *vitriolic acid* and CALCAREOUS EARTH, *marble* is known also to contain CALCAREOUS EARTH.

† *Phosphorus* and *oxygen*. The answer to this natural question, *Whence this oxygen?* is clearly demonstrated over leaf.

If VITRIOLIC ACID * be poured on MARBLE, THIS ACID possessing a superior power of combination or attraction for the *calcareous earth* of the marble, than the *carbonic acid* † has, it unites with the *calcareous earth*, and the *carbonic acid*, becoming disengaged, attracts to itself *caloric* ‡, and escapes in the form of *gas* ||.

MARBLE is therefore a { OXYGEN, combined with
compound of 3 bodies, { CHARCOAL, or the *carbonic acid*; and
CALCAREOUS EARTH.

The *theory of this experiment* will be now easily understood.

At a certain temperature PHOSPHORUS (which is a simple body) overcoming the attraction of the *charcoal* for *oxygen*, deprives the CARBONIC ACID of its *oxygen*, and becomes, in consequence,

1. PHOSPHORIC ACID §, which unites with the *calcareous earth*.

* Sulphur and oxygen.

† Charcoal and oxygen. FIXED AIR is charcoal, oxygen, and CALORIC.

‡ The CALORIC proceeds in part from the *vitriolic acid*; which acid, if poured on *water*, will almost make it *boiling hot*, to the no small astonishment of persons unacquainted with chemical operations. Since *two cold bodies*, coming into contact with each other, give out *heat*, CALORIC, we see, may be in a *dormant or neutralized state*.

|| Viz. CARBONIC ACID GAS, or FIXED AIR; which is charcoal (carbon), oxygen, and a certain quantity of *caloric*. Vide p. 23, Note *.

§ Phosphorus and oxygen.

The

The *phosphoric acid* being *saturated* * with the *calcareous earth*, we have also,

2. PHOSPHORUS united with *calcareous earth*. And,
3. The CHARCOAL of the marble is left us in its *simple state* †.

The proof, by synthesis, that the constituent principles of FIXED AIR ‡, are *charcoal*, and *oxygen AIR*, is more beautiful, as being easier understood. See over leaf.

THE

* If *diluted vitriolic acid* be poured on marble, an effervescence denoting the extrication of *fixed air* is seen; when the union of the *vitriolic acid* and *calcareous earth* is *complete*, it is said to be SATURATED, the effervescence now ceasing.

† The OXYGEN, with which it was before combined, being separated from it, by the *superior attraction* of the PHOSPHORUS.

‡ We owe our first knowledge of FIXED AIR to Dr. BLACK, but that *water* absorbed *this air* upon agitation, and was made Seltzer or Pyrmont water, and that if *iron filings* be put into *this acidulated water*, it became a *chalybeate*, we are indebted to the happy industry of Dr. PRIESTLEY.

The reader may, from the above account, doubt whether MARBLE contains FIXED AIR (*charcoal*, *oxygen*, and *caloric*), or only the CARBONIC ACID (*charcoal* and *oxygen*). We see, indeed, *water* absorbing a large bulk of FIXED AIR. But does not some portion of its *caloric* pass into the *cold water*, and hence the condensation (if I may be allowed the expression) of the FIXED AIR; for if a small heat be applied to the *aeriated water*, it parts with its FIXED AIR. The subject is yet somewhat obscure. If *sulphur* be burnt in *oxygen air* (*oxygen* and *caloric*), VITRIOLIC ACID is gradually formed from the combination of the *sulphur* with the *oxygen*, and the *caloric* is disengaged. If *hydrogen* or *inflammable air* be burnt in *oxygen air*, the combination of the

E

hydrogen

THE SYNTHESIS.

THIS CHARCOAL * Mr. TENANT then burnt in *oxygen air*, which was converted into an ACID GAS, whose *weight* equalled the sum of the *weights* of the *charcoal* which had been burnt, and the *oxygen air* employed †.

THIS ACID GAS had all the *properties* of FIXED AIR. It was readily upon agitation *imbibed by water*, which acquired the sparkling appearance and taste of Pyrmont and Seltzer water. *This acidulated water* dissolved iron filings, and became a perfect chalybeate water. THIS AIR weighed *heavier* than *common air*. A candle being put in it, was quickly *extinguished*, and *an animal* died *convulsed in it*.

hydrogen with the *oxygen* is very rapid, and WATER is formed, and *the caloric* is suddenly disengaged: but if VITRIOLIC ACID be poured on WATER, a considerable quantity of *caloric* is then *also* disengaged, which seems to prove, that *in the condensation of airs*, on their change into solid substances, only a *portion* of their CALORIC is disengaged.

* ANY CHARCOAL would have had the same effect.

† FIXED AIR, or the CARBONIC ACID AIR, is composed of 28 parts of *charcoal* to 72 of *oxygen air*; or, in other words, 144 cubic inches of *that air* will saturate or take up 28 grains of *charcoal*.

THE

THE ANALYSIS

OF

ADEPS, OR ANIMAL FAT;

Or its separation into its { HYDROGEN, and
2 CONSTITUENT PARTS, { CHARCOAL.

ANIMAL SUBSTANCES give the same products in distillation as the *cruciform** tribe of plants, viz.

ELEMENTS.

	1.	2.	3.	4.	5.
1. WATER, - -	oxygen,	& hydrogen,	- -		
2. OIL, - - -	- -	hydrogen,	& charcoal.		
3. CARBONIC ACID,	oxygen,	- -	& charcoal.		
4. CHARCOAL, -	- -	- -	- -		
5. PHOSPHORATED } CHARCOAL, - }	- -	- -	charcoal, & phosphorus.		
6. AMMONIAC, -	- -	hydrogen,	- -	- -	& Azot.

But as these substances contain more *hydrogen* and *azot* than such vegetables, they therefore produce a greater quantity of OIL and AMMONIAC.

That

* From most vegetable substances, excepting the cruciform plants, we obtain, by slow distillation,

FIRST EXPERIMENT.

ELEMENTS.

	1.	2.	3.
1. WATER, - -	oxygen,	& hydrogen.	
2. OIL, - - -	- -	hydrogen,	& charcoal (as will be proved).
3. CARBONIC ACID,	oxygen,	- -	& charcoal.
4. CHARCOAL.			

or, in other words, we obtain WATER acidulated with CARBONIC ACID, on the surface of which floats ESSENTIAL OIL,—and there remains in the retort unvolatalized by *caloric*, CARBON OR CHARCOAL.

But had the heat at first been considerable in the furnace, we should have had *from the same materials*, instead of WATER,

SECOND EXPERIMENT.

ELEMENTS.

From
the furnace.

	1.	2.	3.	4.
1. CARBONIC ACID GAS,	oxygen,	- -	charcoal,	& caloric.

The *oxygen* under these circumstances has a greater affinity for *carbon* than for *hydrogen*. And instead of OIL,

	1.	2.	3.	4.
2. HYDROGEN GAS, -	- -	hydrogen,	- -	& caloric.

The *hydrogen* having in this case a greater affinity for *caloric* than for *charcoal*. And,

3. CHARCOAL.

It is an axiom in chemistry, that in all its operations nothing is *created*, but only a new *arrangement of parts* takes place: for *the quantity of matter* still remains the same after every process.

In the SECOND EXPERIMENT we have seen *vegetable matter* reduced to its *primeval elements*, HYDROGEN, OXYGEN, and CHARCOAL. If we carefully ascertain the quantity of HYDROGEN and CHARCOAL produced in the first experiment, and *compare this quantity* with the quantity of HYDROGEN and CHARCOAL produced in the second experiment, we shall find a *loss* or *deficiency* of these *two simple elements* in the produce of the FIRST EXPERIMENT, which corresponds exactly with *the weight* of the OIL.

VEGETABLE OIL is composed therefore of *hydrogen* and *charcoal*.

I cannot

That ANIMAL OIL or ADEPS is composed, like VEGETABLE OIL, of *charcoal* and *hydrogen*, will appear evident from the following *analysis*, or separation of ANIMAL OIL into its constituent principles.

In the first rectification of *animal oil* a small quantity of WATER is formed by the union of the *oxygen* contained in the air of the distilling vessel, and the *hydrogen* of the oil. We can at length, by frequent distillations, decompose the *whole oil*, and convert it into WATER (*oxygen* and *hydrogen*) and CHARCOAL, and the weights of the CHARCOAL and WATER will be found exactly corresponding with those of the OIL and the OXYGEN AIR consumed.

I cannot help here observing the use that vegetation is of to animal life as first discovered by Dr. INGENHOUST, in furnishing the atmosphere during the day with abundance of VITAL OR OXYGEN AIR. Dr. PRIESTLEY's experiments likewise prove that vegetables absorb the NOXIOUS AIR (*fixed air*) produced from combustion, respiration, and putrefaction; for which discovery he received the thanks of the Royal Society.

Dr. FRANKLIN, in writing to this illustrious experimentalist, says, "That the *vegetable creation* should restore the air, which has been spoilt by the *animal part of it*, looks like a rational system, and seems to be of a piece with the rest." Having observed the rapid increase that plants had in *air fatal* to animals (*fixed air*), he adds, "This seems to prove that something is taken from the air."

It now appears that the vessels on the under surface of leaves absorb WATER from the air, which passing along the capillary tubes of the superior surface, by the action of the *sun*, and the influence of *light*, becomes decomposed, and the HYDROGEN of the *water* unites with the *substance* of the plant as one of its principles, while the superabundant OXYGEN is thrown out in the form of the PUREST VITAL, OR OXYGEN GAS.

But

But should the reader have any remaining doubts on this subject, he will be convinced by the perusal of the following *curious account*.

By an arrêt from government *the burying ground* of the INNOCENTS at PARIS, which had been the common receptacle of a great part of the dead of that city for *many centuries*, was directed to be removed. It was composed of different burying-places. This name was given to excavations about 30 feet deep, and 20 in breadth, dug in the cemetery of the Innocents, in which were placed in tiers the bodies of the poor, inclosed in their coffins. The necessity they were under of aggregating together a great number, obliged the men employed in this business to place the coffins so near to each other, that these graves may be conceived as filled with a mass of dead bodies, separated from each other only by slight boards. Each of these graves contained about 1500 bodies. When full, the last row was covered with about a foot of earth, and a new cavity was opened at some distance. Each cavity was filled in about three years. The number of the dead, relative to the extent of the church-yard, regulated the *re-opening* of the *same ground* at periods of various extent. The shortest time, however, before an opening was made in the same spot was 15 years. Ex-

perience had taught these grave-diggers that *this period* was not sufficient for the total destruction of the bodies, whilst it made them acquainted with the change which we are about to describe.

The opening which the *French chemists* ordered to be first made, was that of a grave which had been filled and closed up for near 15 years. On raising the covers of some of the coffins, which were in perfect preservation, we saw, say they, the bodies enveloped in linen, which marked out the shapes of the different regions; but when these were lifted up, there was presented to us nothing but *shapeless irregular masses of a soft, ductile, whitish substance.*

These masses every where surrounded the bones. They possessed little solidity, and yielded to pressure. This substance had no unpleasant smell. The grave-diggers had not the smallest repugnance to handle it, and they called this substance, which so much startled the French philosophers, by the term FAT.

After examining several bodies with great attention, they found that all the bodies were not *equally advanced* in this process. In *several, portions of muscular flesh*, distinguished by its *fibrous texture* and *reddish colour*, were
still

still visible, amid great masses of a WHITE FATTY SUBSTANCE.

In the bodies of women, the exterior part of the chest often shewed the glandular substance of the *breasts*, changed into an homogeneous matter of peculiar whiteness, very much resembling SPERMACEI. The *face* was not recognisable in the greater number of bodies. The various parts of the *mouth* were not to be distinguished. The *jaws*, separate from each other, were surrounded with various portions of fat, and lumps of the same matter occupied the *cavity of the mouth*. The cartilages of the *nose* underwent a similar alteration. In the place of *eyes*, the orbits contained only masses of fat; and the *ears* were changed in a similar manner. The *hairy scalp*, though altered like the other parts, still retained the hair. The *brain* was constantly found changed into the same substance as the other organs.

In the *abdomen* there were found irregular masses of the same fat of various sizes. In the *thorax* were small pieces of a fatty matter, of a reddish colour; and sometimes there were observed irregular round masses, which seemed to be formed of the fat and fibres of the heart.

The

The *marrow*, also, in the center of the cylindrical bones was wholly converted into a very pure fat ; it even insinuated itself between the bony plates, filling up their interstices.

Although there is no doubt but that the quantity of this matter is larger in the bodies of such as have been fat than in those who have been lean, the facts we have mentioned, prove that other parts, besides the cellular texture, and fat it contains, are susceptible of this alteration. The following observations are decisive with regard to this point. It is to be presumed, that the greater number of bodies found in this common grave, were, previous to their death, emaciated by disease, and in these the bodies were found *universally* converted into fat, which we cannot suppose to have had a previous existence.

Our curiosity was sufficiently roused, continue these chemists, to extend our researches into other churchyards. In those where bodies were buried in common graves, we found similar appearances. We met with the fatty matter in a sufficient variety of cemeteries to convince us, that the formation of this singular substance was by no means peculiar to the soil in which we had at first observed it, but that it takes place every where,

F

where

where bodies are deposited in great numbers, close to one another, excluded from the action of external agents, and exposed solely to the effects of their constituent principles.

We could obtain no positive information relative to what became of the bodies after they have been once changed into fat; the oldest and most experienced gravedigger knew nothing of this matter.

This conversion of the several parts of the human body into *true animal fat*, must arise, says Monf. LAVOISIER, from the disengagement of AZOT, naturally contained in all animal substances, leaving behind the *hydrogen* and *carbon*, which are the elements proper for the production of FAT or OIL.

Such are the phenomena taking place during the spontaneous dissolution of bodies buried in the earth; phenomena heretofore equally unknown and undescribed, so that even words were wanting to convey our ideas. The present must merely be considered as a very imperfect outline of the picture, which posterity must fill up and finish. For this purpose it will be necessary to live among the tombs, to follow up a long and repeated examination of various graves, and bestow indefatigable attention on the most unpleasant, as well as the

the most melancholy of all pursuits. But even these observations, which an accident, fortunate for philosophy, created, deserve we think a place among the records of useful science*.

* The justly celebrated Spanish traveller, the Rev. Mr. TOWNSEND, who unites with the accomplishments of a gentleman, the profoundest erudition, has, we have been informed, buried a cow, which died by accident, in a water meadow at PEWSEY. The grave is but slightly covered with earth, and a constant stream of fresh water continually passes over it.

Should the result be, the total conversion of the muscular flesh of this cow into *spermaceti*, or the *fatty substance much resembling it*, which is expected to take place in about six months, we make no doubt, but that the public will be favoured with the theory, and method, of this truly admirable and useful experiment.

The *spermaceti* formed by this conversion, will be, probably, worth about *four or five pounds*.

ON PUTREFACTION;
 OR
 THE RESOLUTION OF ORGANIZED MATTER
 INTO
 ITS CONSTITUENT PRINCIPLES.

PUTREFACTION is the great process appointed by the CREATOR, for the resolution of animal and vegetable substances into *the elements* from which they were first formed. By this process, the oak and the bramble, the cedar and the hyssop, fruits, whether delicious, or nutritive, or acrid, or poisonous, the most beautiful of the human species, and the most frightful of the other tribes of animals, are all reduced to one common lot: they finally return back to their original and primeval elements*.

* WATER and AIR, says Sir ISAAC NEWTON, composed of old worn particles and fragments of particles, would not be of the same *texture* and *nature* now as at the beginning, did not the *primitive particles* of MATTER continue entire, and compose bodies of one and the same nature and texture in all ages. The changes of corporeal things are to be placed only in the various separations and new associations of these permanent particles. OPTICS, p. 376.

This

This resolution of bodies, when philosophically considered, is equally wonderful with their formation; and is alike governed by *regular and invariable laws*. Every plant brings forth its own kind, and every animal its own species. These live, they are nourished, and silently hasten to decay; they pass back to their *elementary state*, and are *again employed* as the *constituent parts* of *other vegetables* and *other animals*. Such, with respect to the material part of the creation, is the amazing circle of LIFE and DEATH! A circle in which nature keeps her steady rounds, and moves agreeably to laws established by the ALMIGHTY.

Vegetable substances which consist of HYDROGEN, OXYGEN, and CARBON, maintain for a long while their organised structure, and putrefy with difficulty. Having passed through first the *vinous* * and then the *acetous fermentations*,

* The first effect we see produced on vegetable substances which have lost their VITAL PRINCIPLE, is the destruction of the equilibrium, or just union of their three constituent principles (*hydrogen, oxygen, and carbon*), by the action, or operation, of *heat and moisture*. The OXYGEN unites with the CARBON, and the fermenting juice is covered on its surface with *carbonic acid gas*. The specific gravity of the liquor is now considerably diminished, and if exposed to distillation, it affords a *light inflammable substance*, called ALCOHOL, or SPIRIT OF WINE: which, as we might reasonably expect from the volatilization in great part of the *carbon and oxygen*, is almost entirely made up of

fermentations *, they at length become subject to the *putrefactive ferment* †, and the HYDROGEN of the vegetable escapes in the form of *hydrogen gas*, while the OXYGEN and CARBON evaporate in the form of *carbonic acid gas*, leaving nothing behind but a small residuum of carbon and vegetable earth.

It is different with substances containing a portion of AZOT. The *equilibrium of parts* is soon destroyed. Hence it is that animal excrements, which contain, like other animal matters, a quantity of AZOT ‡, are added to the elements, capable of putrefaction, to form composts or dunghills.

of the other vegetable principle, *hydrogen*: for if 8 ounces of SPIRIT OF WINE OR ALKOHOL be burnt in a confined apparatus containing only *oxygen gas*, the product will be 9 ounces of WATER. The ALKOHOL, having in this case increased its weight *an ounce*, must have attracted *something*, and *this something* can be *nothing else* but OXYGEN, the base of *oxygen air*, and the CALORIC of the *oxygen air* being disengaged, is seen in its active form during the combustion.

* This *second stage* of spontaneous decomposition, as it is called, is nothing more than the *absorption* or *imbibing* of OXYGEN from the air.

† When the spontaneous decomposition is suffered to proceed beyond the *acetous process*, then the *third state*, or PUTREFACTIVE FERMENT, takes place.

‡ The putrefactive process is most eminently perceived in *animal bodies*. These either putrefy immediately; or, if the putrefaction be *preceded* by either of the other stages, their duration is too short to be perceived.

The

The addition of AZOT not only accelerates the putrefactive process, but the *azot* combining with the *hydrogen* affords a new product, which is AMMONIAC or VOLATILE ALKALI *. Monf. Bertholet has proved, by a variety of experiments, that AMMONIAC is produced by the union of *azot* and *hydrogen*, for if the *azot* in the *animal substances* be disengaged by the action of diluted nitrous acid, NO AMMONIAC will be produced, and in all cases putrifying substances furnish AMMONIAC, only in proportion to the *azot* they contain.

The following experiment also fully proves the composition of AMMONIAC.

If AMMONIAC be combined, says Monf. FOURCROY, with a METALLIC OXYD, the *hydrogen* of the AMMONIAC will unite with the *oxygen* of the METALLIC OXYD, and form *water*, whilst the *metal* is revived, and the *azot*, being left free, will unite with the *caloric* and assume the form of a *gas* or *air*.

AMMONIAC has a peculiar penetrating odour. In the putrefaction of animal substances sometimes AMMONIAC predominates, which is easily perceived by its sharpness

* *This compound* did not naturally exist in the animal substance, but is formed by the combination, in a certain proportion, of two of its constituent elements.

upon the eyes, and sometimes, as in putrid herrings, the PHOSPHORATED HYDROGEN GAS is most abundant.

PHOSPHORUS is found in almost all animal substances, and in some plants which give indeed a kind of animal analysis.

It is chiefly to AMMONIAC (*hydrogen and azot*) and PHOSPHORUS dissolved in HYDROGEN GAS, that the fœtor issuing from the putrefaction of animal substances depends. This vapour is highly hurtful to animal life. When accumulated, if the pick-axe of the grave-digger unfortunately ruptures the coffin, it bursts forth, and oftentimes proves fatal to the sexton, and is seen to affect even persons *at a distance* with vertigo, nausea, and uneasiness. May we not conceive, that a poison sufficiently subtle to produce the immediate death of many when it first escapes from the place where it is confined, may even after it is diffused in the air retain virulence enough to injure the delicate animal fibre? After having observed the constant dread that grave-diggers have for this poisonous vapour, after having seen the cadaverous paleness of countenance, and other marks of the gradual action of a slow poison so evident in the appearance of *all men employed much in church-yards*, it is impossible not to believe that the air in their immediate neighbour-

hood must, in some measure, injure the health of the inhabitants*.

* The same squalid appearance is observed also in persons who live in places where animal substances are allowed to putrefy. Mr. CAREY, in describing the dreadful *fever* which last summer prevailed in PHILADELPHIA, and swept off above 4000 persons, emphatically says, "Shall I be pardoned for passing a censure on those, whose mistaken zeal led them, during the most dreadful stages of this calamity, to crowd our churches, and aid this frightful enemy in his work of destruction? who, fearful lest his prayers and adorations at home would not find acceptance before the Deity, resorted to *churches filled with bodies*, where, with every breath, they inhaled a CONTAGIOUS AIR. To this single cause I am bold in ascribing a large proportion of the mortality. I hope," he continues, "the awful lesson some of our congregations hold forth on this subject, by a *mortality* out of all proportion to their numbers, will serve as a MEMENTO at all future times."

This benevolent gentleman would not surely wish to prevent persons from assembling together, especially in times of calamity, to pay their worship to THE SUPREME BEING, from whom every blessing that we enjoy flows, and on whom we utterly depend; but he should rather caution us against *small* churches, and the abominable practice of *burying the dead* in them, and thus converting the temples of GOD literally into *bone houses*.

The parish church of St. LAWRENCE, in the ISLE OF WIGHT, would be crowded, if the congregation consisted of more than 20 persons; with a stick of a moderate length you may reach to nearly two thirds of its height. MEETING-HOUSES usually carry with them the same objection.

ON CALCULI
AND
THEIR SOLVENTS.

THE celebrated chemist Mr. SCHEELÉ imagines, that all urine, even that of children, contains the constituent principles of calculi ; but that, in the heat of the human body, these are dissolved, and suspended by some unknown acid * *menstruum*. On evaporating four cans of fresh urine to two ounces, a fine powder is deposited as it cools, and a part firmly adheres to the glass. Both the *incrustation* and *precipitated powder* readily dissolve in a few drops of CAUSTIC FIXED ALKALI ; and have, in *other respects*, all the properties of calculi.

* Urine was *formerly* considered as an *alkaline liquor*, or *lixivium* ; but Monf. BARTHOLLET has remarked, that it always contains an excess of PHOSPHORIC ACIDS, which *reddens* the tincture of turnsole. This eminent physician first discovered, that the urine of *gouty* persons contains *less acid salt* than that of persons in perfect health ; that during the fit of the gout, this fluid is much *more acid than usual*, though not more so than the urine of a robust person. He conjectures, that in *gouty patients* the PHOSPHORIC ACID is not evacuated by urine, as in healthy persons ; that it wanders, as it were, and is carried into the articulations, where it excites much irritation and pain.

It

It hath been often observed that BILIARY CALCULI are only found in the gall-bladder of *oxen* after dry seasons, and a scarcity of fresh fodder, and that they disappear in the spring and autumn, whenever these animals are supplied with abundance of succulent vegetables. Hence these stones are only to be met with in them, from the month of November to the month of March, and not *afterwards*, which phenomenon shews that succulent plants have a power of *preventing*, and even *dissolving*, BILIARY CALCULI, *even after they are formed* *.

Monf. de MORVEAU thinks that the *chalky matter*, often found in the lungs, and on the different joints of gouty people, which physicians have supposed to be of the same nature as the calculus of the bladder, is very *different* from *that substance*; but he grounds this opinion only on certain experiments of one Whytt, which are far from possessing the accuracy at present required in experimental philosophy. But from the observations of HOFFMAN, BOERHAAVE, DE HAEN, HARTLEY,

* Reasoning from *analogy*, some solvent may yet be expected for this common and excruciating disorder. When a GALL-STONE has obstructed the duct, *jaundice* is produced, and the pain of passing the stone into the duodenum is oftentimes more terrible than the pains even of the most difficult labour.

KIRKPATRICK, &c. on the *good effects* of ALKALINE WATERS, SOAP, and LIME WATERS, on the *arthritic and calculous affections* *, it appears to me, says Monf. FOURCROY, more proper to ascertain the existence of an *analogy* between these *two kinds of concretions*, than the former are capable of *disproving it*. It must, however, be allowed, as Monf. de MORVEAU observes, that experiment alone is sufficient to decide *the question*, which affords an additional proof *of the great importance of CHEMICAL RESEARCHES in the art of medicine, and the advantages it promises to that useful science*.

* That *mineral, or volatile alkali*, have been useful in the above disorders, has been affirmed by experienced physicians; and I know an instance myself of *mineral alkali* and *nitrous ammoniac* being serviceable in a pulmonary complaint of some standing.

The lungs of that most horrid villain BARKER, who, in order to *celebrate* his jail deliverance with some others, wantonly murdered an inoffensive man on Saffron Hill, was found throughout replete with *calcareous matter*. The Head Constable had been wounded by this miscreant some years before, and had never enjoyed since that time any health. As he recognized, unexpectedly, the wretch at the instant of his execution in Hatton Garden, he was so struck with the awful occasion, and *the retributive hand of PROVIDENCE*, that he was forced to relinquish his duty, and had scarcely reached home before he breathed his last.

THE SOLUTION OF CALCULI

BY

ALKALINE REMEDIES.

Books and tradition never fail to offer a multitude of medicines for diseases that are frequent and incurable ; many of these medicines are the suggestion of the most fantastic analogies*, and the greater part are incapable of even palliating for a moment the sufferings of the patient ; yet a list, at first sight so unpromising, is not *absolutely* without its use. *The physician stalks abroad with an air of greater dignity when he feels a full quiver at his shoulders, however blunt may be the arrows it contains ;*

* There exists, probably, no human malady, not even the jaundice, consumption, asthma, or cancer excepted, for which so many whimsical and nugatory means of relief have been proposed, as for the STONE and GRAVEL. Besides an infinity of inefficacious simples, the whole series of remedies, from the *warm goat's blood* of ALEXANDER TRALLIANUS, the *pounded glass* of BERICELLUS A SANCTO MARCO, the *essence of pigeon's dung* of JOHANNES POPPIUS, the *quinta essentia urinæ humanæ* of FABRI, down to the *spiritus microcosmi e stercore humano* of another chemical or alchemical doctor, at once afford a proof of the inefficacy of each particular medicine, and of the prevalence of a disorder, which could enforce so much attention, and suggest so many extravagant projects. Dr. BEDDOES.

and

and it supplies a staff, however feeble, on which the wearied spirits of the patient may rest, and defers a little that season of settled gloom when futurity has nothing farther to promise to hope.

But from all the testimonies that have fallen under my observation, continues the justly celebrated and philanthropic Dr. BEDDOES, I can collect that, during the former part of the present century, some approaches have been making towards a remedy, which, whatever *may be its mode of operation, or precise degree of efficacy*, is undoubtedly capable both of *relieving pain*, which renders the disorder so formidable, and of *suspending the progress of the disease itself*.

As early as the year 1721, ROBINSON proposed *salt of tartar*, among other things, as a SOLVENT for the stone. In disorders of the uropoetic organs, whether arising from concretions or not, HOFFMAN praises the efficacy of the hot *alkaline* springs of Germany, as well as the *salt* obtained from the waters of CARLSHAB.

Mrs. STEPHENS having met by accident with a receipt for the STONE, consisting of *egg-shells* dried in an oven and powdered, she administered it to several persons afflicted with that disease. Afterwards she burnt the egg-shells, which became at first black, but being
kept

kept longer in the fire, turned to a grey colour, bordering on a perfect white. After some trials of these black and grey powders in the quantity of as much as would lie on a shilling, three times a day, it appeared to her that the powder was more efficacious in proportion as the egg-shells were more burnt. But finding that it often caused great costiveness, she added a small quantity of *soap* occasionally, to each dose, with a view to prevent this inconvenience. And thus she continued giving the *burnt egg-shells* with a small quantity of *soap* for several years, curing "GRAVELLY COMPLAINTS thereby, and sometimes DISSOLVING STONES IN THE BLADDER. After twelve years, she gave her powder in larger doses to one Mr. COXON, adding to it very frequently *half an ounce of soap* in decoction. He had the symptoms of A STONE in his bladder, *voided*, while taking the remedy, many *concave* and *convex scales*, with some *solid fragments of stone*, grew at length *perfectly well*, and never after that had any return of his complaint. He died at the age of eighty. As this gentleman had received a more conspicuous cure than any other person before him, Mrs. STEPHENS began to augment the *quantity of the powder* and *the soap*, and found them attended with proportionably greater success.

In the year 1735, the Hon. EDWARD CARTERET, Esq. *Post-Master General*, began Mrs. STEPHENS's medicines, and received *great benefit*. This engaged the attention of the public, and more particularly of such as were afflicted with the stone or gravel, so that the number of persons that took her medicine increased every day.

In the year 1737, the cures performed were so many, and so well attested*, that the speedy publication of them

* Mr. BOLTON having obtained a cure by Mrs. STEPHENS's medicine, wrote to Dr. HARTLEY as follows, from NEWCASTLE upon TYNE.

DEAR SIR,

A more particular and exact account of all that have taken Mrs. STEPHENS's medicines, when it comes out, must be a great and most convincing proof of the good effects of them, and prevail on the charitable part of this nation to put a helping hand towards so universal a good, and the unspeakable benefit the poorer sort may reap from it.

For my own part, I thank God I am so perfectly cured of the stone by taking them, that I never since have felt the least symptom of pain from that distemper with which I had been sore afflicted about two years before, and could not endure to ride on horseback, which exercise I can now bear with pleasure.

I took all the things before this that I could hear of in this country to make me easy, but without effect. I began the medicines in much pain, which, with some intermission, continued for about a fortnight, and then it abated, and I was somewhat easy; but had more or less of pain, night and day, with some remission indeed, during the time of taking the remedy. I did not hear of any that complained so much as I did; perhaps the stone might be of a harder nature than usual, and might not dissolve so kindly as in others,

them was judged to be of great importance to mankind : and accordingly, in the year 1738, a proposal for raising 5000*l.* by voluntary contributions, as a reward to Mrs.

STEPHENS

others, but by persisting in the medicines, the stone began to dissolve and come away in bits, and I was then more easy.

Mr. BINFORD and Mr. HOLLAND both took the medicines at the same time I did ; they each came to shew me what came from them, and to compare with me. I observed that the operation was the very same with them, having just such bits as I had, and at the last a larger hard stone, which appeared to be the *kernel*. They were so much alike that one would think they all came from the same person. The bits are perfect stone, only *soft* at coming away ; but laid on a paper they soon dry to be perceived what they are. It is a surprising medicine, and would be of great use, and if known, a vast kindness to poor people, who are not able to give the price it now is. The manual operation is come to perfection ; yet how must the poorer sort come at it in the country, when they cry out for some assistance ?

Since my recovery to health and strength, some of the poor pit-men in pain and distress have been to enquire of me what I took. When I told them they complained lamentably of their affliction and poverty, not being able to pay the price of the medicines. Some are since dead. For while they strive to labour under such grievous pain, they perish for want of relief, and it is hoped all good and well-disposed Christians, who have any charity or benevolence for mankind, will consider and promote the noble design you have undertaken.

I have the honour to be, &c.

Vide also the case of Mr. UNDERWOOD in the frontispiece.

Dr. HARTLEY having himself commenced Mrs. STEPHENS's medicine, voided in consequence *many fragments of stone*, and feeling less pain than before, and being better able to jumble over the pavement in London, he conceived a high opinion of the efficacy of Mrs. STEPHENS's remedy. He therefore collected and published 154 trials. Several of the cases were drawn up by the persons themselves, or written from their accounts. " If," says he, " I have flattered myself with false hopes, it is especially my interest to be undeceived, and my duty to acknowledge my error. But if, on the contrary, I have satisf-

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factorily

STEPHENS for discovering her medicines, was presented before the public with *her consent* *.

As this proposal, however, did not meet with the expected success, she was advised, in the beginning of the year 1739, to apply to the HOUSE OF COMMONS for the above-mentioned reward, submitting her medicines, when discovered, to such examination as the House should think right, before the payment of the reward. This she did, and a bill was brought in for the purpose,

factorily proved a dissolving power in the medicated urine, Mrs. STEPHENS will appear to you (the College of Physicians) in a different light from the common pretenders to *nostrums*, and you will not think the measures that have been taken by me *to obtain the publication of her medicines*, any encouragement of an IMPOSTOR. Vide p. 53, par. 2.

* From April 1738 to February 1739, the subscription was open, and near 1,400 l. was collected. Among the list of subscribers we note, with pleasure, the illustrious names of *several eminent physicians*.

MRS. STEPHENS'S PROPOSALS WERE,

- I. As soon as 5,000 l. are raised by voluntary subscription, Mrs. STEPHENS shall discover her medicines, and they shall be made public.
- II. That time sufficient for the trial of her medicines shall be given, and she shall receive the 5,000 l. contribution, if it shall appear to the Archbishop of Canterbury, the Duke of Richmond, the Earl of Pembroke, &c. that *these medicines are able to dissolve stones in the bladder*;—but if *THIS does not clearly appear*, THE PRINCIPAL SHALL BE RETURNED TO THE CONTRIBUTORS.

Surely no proposal could be more *fair or honourable to one party*. Dr. HARTLEY has emphatically marked in italics, among the list of subscribers, the names of but *two* bishops and *one* surgeon!

which

which passed BOTH HOUSES, and had the ROYAL ASSENT at the conclusion of the Sessions, June 14, 1738. She next presented a paper, containing her method of preparing and giving her medicines, to his Grace the Archbishop of Canterbury, June 16th following. Trials were made with the medicine thus discovered. They were found to produce the promised effects; the trustees named in the Act of Parliament met March 5, 1740, gave Mrs. STEPHENS the certificate required by that act, and *she received the 5,000l. reward at the EXCHEQUER, March 17th following.*

EXTRACT FROM THE GAZETTE, MARCH 18, 1740.

I. MR. GARDINER*, of *Fetter-lane*, aged 61, had the usual symptoms of a STONE in the bladder, with *violent pains* for several years. He was searched by Mr. NOURSE, surgeon, Dec. 30, 1738, when both he, and Mr. WALL, apothecary, felt a STONE in the bladder. MR. GARDINER took the medicines about eight months, *voided* MANY PIECES OF STONE in that time, was FREED FROM ALL HIS SYMPTOMS; and being searched again, first by Mr. SHARP, Sept. 14, 1739, and

* These were the selected persons, on whom the medicines were tried, and who were examined by the HOUSE on oath.

then on the 30th of November following by Mr. NOURSE, Mr. CHESELDEN, Mr. SAINTHILL, and Mr. BELCHER, surgeons, NO STONE COULD BE FOUND.

2. PETER APPLETON, of *Black-friars*, aged 67, had the symptoms of A STONE in the bladder for more than seven years, with excessive pains for the five last years of that time. He was searched July 6, 1739, by Mr. SHARP, and found to have a stone in the bladder, which stone was also felt by Dr. PELLET, Dr. NESBIT, Dr. WHITAKER, and Dr. HARTLEY, and judged by all present to be a large one. He took the medicines for about five months, during which time he voided a very large quantity of stone in flakes and small fragments. He grew QUITE FREE FROM ALL HIS COMPLAINTS, and was searched again, first by Mr. SHARP, Nov. 9, and afterwards by thirteen physicians and surgeons; BUT NO STONE COULD THEY FIND.

3. HENRY NORRIS, of *Leather-lane*, aged 55, had the symptoms of a stone in the bladder for about a year and a half. August 17, 1739, he was searched by several physicians and surgeons, who all felt THE STONE. He took the medicines about four months, and voided only A THICK SEDIMENT in that time, however he was
free

free from all his symptoms;—and being searched again, Dec. 14, by eight physicians and surgeons—NO STONE COULD BE FOUND.

4. WILLIAM BRIGHTY, of *Colchester*, aged 79, had the symptoms of stone in the bladder for more than three years. He was searched Sept. 8, 1739, by Dr. GARDINER and Mr. SHARP, and found to have A STONE. He took the medicines for about four months, *voided many pieces of stone during that time, became free from all his symptoms*; and being searched again by Dr. GARDINER, Mr. SHARP, and Mr. BELCHER,—NO STONE COULD BE FOUND.

Out of 154 cases* published with a view to recommend Mrs. STEPHENS's remedy to the notice of the public, by the celebrated DAVID HARTLEY, M.D. and which he addressed to the President and Fellows of the Royal College of Physicians, I shall only extract the case of Dr. KIRKPATRICK, an eminent practitioner of physic in Ireland. Perhaps it might be serviceable to mankind, if physicians, attentive to the progress of science, and their own feelings, were, from time to time, to become martyrs to those diseases for which remedies are still wanting, or are but newly introduced.

* Vide note p. 48.

DR. KIRKPATRICK'S CASE.

For these sixteen years past I have been afflicted with the gravel in the kidneys, and after the usual paroxysms of vomiting, &c. the use of the warm bath, emollient clysters, &c. have passed divers stones. The last of these severe fits was in July 1737; I then passed a small stone, and have since that period been subject to violent attacks of strangury.

1738.

Oct. 17. I began Mrs. STEPHENS's medicines.

18. The urine smelt *strong*, and my *pains* were increased, which were almost continual. I passed one *oblong angular bit of stone* that day.

19. The urine full of *white sediment*, and continues so. Frequent *stoppage*. Great *pain*.

20. Frequent *stoppage*. Passed 1 *angular broad flake of stone*.

21. Less *pain*. Passed 3 *flakes of stone*.

22. Less *pain*. Passed many *angular bits*, but small. Extreme *pain* for half an hour.

Oa.

Oct. 23. Passed more than 12 *white flakes of stone*, and above 20 *small angular bits*. In my microscope, the flakes appear very distinctly like pieces of rotten rock rent asunder.

24. Passed *as many flakes* to-day as yesterday. Some of them WHITE on one side, and a little REDDISH on the other.

Observations. I apprehend the WHITE SIDE is that exposed to the medicated urine, and the OTHER SIDE is that which is broke off from the *main stone*, whose colour it may be supposed to have.

Since I have taken Mrs. STEPHENS's medicine my urine is become ALKALINE, that is, it turns syrup of violets *green*, and *ferments* with acid liquors. This I thought very remarkable when I first observed it, and began to hope, that urine, which was so different from common urine, might have different effects upon stones in the kidneys and bladder. And I have lately been informed, that even common urine, when it putrefies, that is, turns ALKALINE by being kept, will dissolve and take up the *calculous incrustations* upon the sides and bottoms of the urinals. I boiled different pieces of stones, which were taken from the human bladder, in my own ALKALINE urine, and common urine. The

first were wasted considerably, and their surface turned WHITE and SOFT:—but those in common urine had little effect produced on them.

I shall continue to send you an abstract of my diary, which I keep very exactly. I constantly confine myself to my chamber, that by a state of rest the medicated urine may lie longer upon the stone. I believe you will think this account as encouraging as could be expected in nine days. I confess the event has much exceeded my expectations. Such as it is I have sent it, that I might *do justice to* Mrs. STEPHENS, and also *to* THE PUBLIC. I long much to know the state of the subscription, and whether you be able to make any probable calculation when it will be completed, that the public may have the knowledge of this GLORIOUS DISCOVERY*.

Oct. 25. Passed 37 *flakes of stone*, 3 thicker than usual, and one of them much larger than any of the former. Much *white sediment*, many *angular bits*.

26. Passed 68 *flakes of stone*, many of them equal to the largest of the former.

27. Passed 64 *flakes*.

28. Passed 90 *flakes*.

* Vide note * p. 50.

Oct.

Oct. 29. Passed 38 *flakes*, 2 of them a quarter of an inch broad.

30. Passed 34 *flakes*.

31. Passed 56 *flakes*.

Nov. 1. Passed 29 *flakes*.

Observation. All I have passed are CONVEX and WHITE on one side, CONCAVE and BROWN on the other.

2. Passed 6 *flakes*.

3. NO FLAKES OR BITS.

4. }
5. } NO FLAKES.
6. }

Observation. There appears a kind of stop in the operation of the medicine, though my mode of living is the same, and I take my medicine regularly.

Perhaps the OUTWARD COAT of the stone is come away, and the INTERNAL COAT is much *harder*, and requires more time in being dissolved and broken down.

I have had throughout *great pain* in passing my water, but especially these last four days. Having gathered a large tea spoonful of the *white sediment*, and drained off the urine from it as well as I could, I left it three days

I

in

in the open air, and found the urine evaporated, and the sediment grown into a *solid calculous mass*, which I broke into pieces. These had the same appearance in my microscope as *the flakes of stone* which I had passed. I think this seems to prove that *the white sediment* is really a part of the stone, resolved into an impalpable powder.

Nov. 7. Passed 1 *flake*, and 1 *angular bit*.

8. Passed 1 *flake*.

9. Passed 2 *bits* of the same substance with the *flakes*, but softer.

10. Passed 2 *flakes*, pretty large, one of them having the surface of a sphere, or like the top of a brass nail, with a convexity and concavity; also 1 *bit* of stone, of a dirty colour, with *veins of white*.

11.	}	Passed no flakes, but <i>divers angular bits</i> , with much <i>white sediment</i> ,—PELLUCID MUCUS, and VERY GREAT PAIN.
12.		
13.		
14.		
15.		

My pains have been great throughout, but *most* when *this mucus* passes from me. Sometimes I imagine this mucus is no more than *the mucus* secreted from

the glands of the bladder and urethra, contrived by PROVIDENT NATURE to sheath the acrimonious salts of the urine, that they might not offend the tender parts through which they pass; and that THE ALKALINE MEDICATED URINE is so *very deterfive* as to wear off and scour away this mucus, leaving the bladder and adjoining parts exceeding bare, and consequently obnoxious to pains raised by the stony particles, angular bits, and coarser parts of the sediment while passing*.

Besides the disagreeable taste of Mrs. STEPHENS'S SOLVENT, and its frequently nauseating the stomach, its caustic and irritating effects on the animal system, and the urinary passages in particular, were great discouragements to its liberal use.

Mrs. STEPHENS'S *medicines*, notwithstanding the great relief they had afforded to many, were therefore soon laid aside. They were, however, laid aside *with regret*,

* We will break off the relation of this case here, not to tire our readers with a repetition of the same story, observing, at the same time, that Mrs. STEPHENS'S medicines, when once begun cannot be left off, however strong the indications to desist from their use; for THE STONE, having become *corroded* and *softened* by the medicated urine, ceases to irritate the bladder; but if the medicines are left off, it soon returns to a state of hardness, and the rugged surface occasions then the most lancinating pains.

since this inference seemed to be warranted by the whole sum of facts, that *much benefit* might be derived from them, provided their COLLATERAL BAD EFFECTS could be obviated. Could *these inconveniencies* be removed by any combination, that would still leave *the alkaline salt* at liberty to unite with *the acid*, which is supposed to contribute to the formation of these calculi, the purpose of *preventing their being generated*, or of *dissolving them when formed*, would probably be in a good measure answered. It was reserved for a respectable member of the medical profession, still living*, to engage THE MODERN CHEMISTRY in the service of medicine, and realize a project, which now seemed to be relinquished in despair. This gentleman's reflections were quickened by his own feelings, and in 1778, after having been for *eighteen* years subject to severe paroxysms, began to take a solution of FIXED VEGETABLE ALKALI, supersaturated with CARBONIC ACID† (*charcoal and oxygen*). This medicine very soon relieved his symptoms, and, as it will appear from the account of his case, has kept him *free from pain for ten years*, one slight attack excepted,

* BENJAMIN COLBORNE, Esq.

which

which is ascribed to *the discontinuance of the medicine for several weeks.*

† This Gentleman thought that by this means *the alkaline salt* would be rendered less disagreeable, and at the same time milder, without losing its well known *lithontriptic quality*; for, as Mr. SCHEELLE and Sir TORBERN BERGMAN had proved, that the human calculi in the bladder were made up of *an acid and an earth*, a *double elective attraction* might possibly take place,—THE ACID of *the calculus* having a stronger attraction for the ALKALINE BASIS of *this neutral salt*, would unite with *the alkali* of the neutral salt,—while the CARBONIC ACID, being disengaged from *the neutral salt*, might, in its turn, unite also with THE EARTH OF THE CALCULUS.—He found also, that by infusing pieces of calculi in the urine of such persons as were taking the AQUA MEPHITICA ALKALINA, it exhibited a considerable *lithontriptic quality*, and having put a fragment of a calculus, weighing 51 grains, into THE ALKALINE NEUTRALIZED SOLUTION, at the end of 31 days it was found to have *lost* 36 grains of its original weight.

BENJAMIN COLBORNE'S CASE.

BENJAMIN COLBORNE, Esq. of the city of BATH, in the year 1760, was attacked with a violent nephritic paroxysm, which, after continuing seven or eight days, and being treated with anodyne, oily, and mucilaginous medicines, and bleeding, terminated in the discharge by urine, of a red stone larger than a vetch or tare, after which he continued tolerably well for eight or ten months; often, however, observing small calculous concretions to come away, attended with irritation of the urinary passages.

In about ten months after the first attack, he had another, but neither so violent or of so long duration, which terminated like the first, in the discharge of a stone of a similar colour to the foregoing, but of a smaller size.

The nephritic paroxysm again returned in about five or six months, but not so violent as at first. During this time he was in a course of taking mucilaginous and lubricating remedies.

After

After this he made trial of Mrs. STEPHENS's remedy, as prepared by Dr. D'ESCHERNAY, of which he took about an ounce in a day, once or twice a week.

After this, *he continued free of nephritic complaints about a year and half.* That medicine, however, agreed so ill with his stomach, *producing nausea, indigestion, and crudities, that he was obliged to leave it off.*

About three or four months afterwards he had another attack, which returned upon him every ten or twelve weeks.

In the year 1766, he made a trial of BLACKRIE's LIXIVIUM (or Chittick's remedy), and thought it agreed with him rather better than soap; yet it was so caustic and irritating to the mouth and throat, and produced such painful sensations in his stomach, *that he was obliged to leave it off*; after which his nephritic paroxysm returned every eight or ten weeks as before.

On March 27, 1778, he had an attack of THE GOUT, which continued on him until the 14th of April, when he was taken with a violent vomiting, attended with pain in the left kidney. By the help of the warm bath and bleeding, he passed another calculus. After this he had a second attack of the gout, which continued a few days.

As

As soon as it was over he began the use of the *alkaline medicine* with *fixed air*, as above described *. During the use of this he parted with no gravel, his urine deposited no sediment whatsoever, or discoloured the vessel, though if it was omitted even for a few days these appearances took place, and small bits of gravel were perceived in his water.

From this time he continued in perfect health, and free of all nephritic complaints, until the 26th of August 1783, when, about three in the morning, he was taken with an irritation in the urinary passages, which prevented his sleep, his urine however was not high coloured; about seven in the morning he had two purging stools; he had but little pain in the kidney, but a heavy obtuse sensation over the os pubis, which continued with some sickness till about two o'clock, when the stone seemed to enter the bladder. From that time he became perfectly easy.

In order to discharge the stone from the bladder, he drank large quantities of mucilaginous liquors, and retained his urine as long as possible. About six in the evening he discharged a red calculus, smaller than what he had before done.

* The AQUA MEPHITICA ALKALINA, vide p. 60.

It is proper to observe, *that he had been at HARROWGATE about four or five weeks before this happened*, and drank the Harrowgate water, which, as it acted not only as a purgative, but as a diuretic also, he was induced to think he might *safely omit* THE ALKALINE SOLUTION. It appeared however, to his great disappointment, that the calculus was generated *during that interval*. From that time to the present, he has never, for *two days successively*, omitted taking the SATURATED ALKALINE SOLUTION, and *has never since felt the smallest uneasiness; no grains of sand or other precipitation in the urine, nor any discoloration of the vessel, except when the medicine is omitted for a day*. But, upon taking the solution again, the urine made afterwards *dissolves the former discoloration*, and still continues perfectly *clear*. During the time he was subject to nephritic paroxysms, his urine was subject to putrefy very soon, but since he has taken the solution it will keep three or four days in the warmest weather without shewing any signs of that disposition *. HIS HEALTH, STRENGTH, AND SPIRITS,

ARE

* A piece of mutton being put into 3 ounces of SPRING WATER, into the same quantity of WATER SATURATED WITH THE CARBONIC ACID, and into the same quantity of THE ALKALINE SATURATED SOLUTION,

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and

ARE ALL PERFECTLY GOOD ; AND, AS HE THINKS, BETTER THAN THEY WERE TWENTY YEARS AGO.

Experience has since amply confirmed the virtues of a medicine, which, I apprehend, may be *freely taken without danger*, and even *without inconvenience* (except in a few rare instances), and which seems to have deserved the singular praise of *equalling* the expectations raised by the person who first proposed it.

But when we consider the high price and brittleness of the apparatus, and the care that must be used in conducting the process, and the necessity there is of constantly *continuing* the medicine, *a remedy seemed still wanting adapted to the condition of the poor, who are by no means exempted from calculous disorders.*

In the year 1787, a person belonging to the medical profession, and much afflicted with the gravel, complained to Dr. BEDDOES that he was unable to persevere in the use of the AQUA MEPHITICA ALKALINA, on account of the great dizziness it always occasioned with him. I was led, says this benevolent physician, from this intimation

and all closely corked up, and placed in a closet in a room wherein a constant fire was kept. After 13 days the SIMPLE WATER had acquired a very offensive and putrid smell, the WATER IMPREGNATED WITH THE CARBONIC ACID had only a musty smell, and that which contained THE ALKALINE SATURATED SOLUTION *was perfectly SWEET.* Dr. Falconer.

to reflect upon the subject, and after some time fell upon a formula, of which I think myself fully warranted in asserting, that it is *extremely beneficial* in CALCULOUS COMPLAINTS, and that it may, *without injury*, be taken in very *large quantities*, and continued for a *great length of time*. Its SIMPLICITY and its CHEAPNESS are its *great recommendations*. It is SAL SODA, OR NATRON, *made into the form of pills with soap, or any other cement*. *Bark* and *aromatic* may be occasionally added. The trials that have been already made of *this remedy* sufficiently prove it to be at the same time both *efficacious* and *harmless*; and THIS INVENTION may be truly ranked among the many very *useful discoveries* that have been made by this excellent and truly philanthropic physician.
