

**Experiments establishing a criterion between mucaginous and purulent matter. And an account of the retrograde motions of the absorbent vessels of animal bodies in some diseases / [Edited, with a life of the author, by E. Darwin].**

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DARWIN, C. 19699/P  
EXPERIMENTS

Establishing a CRITERION

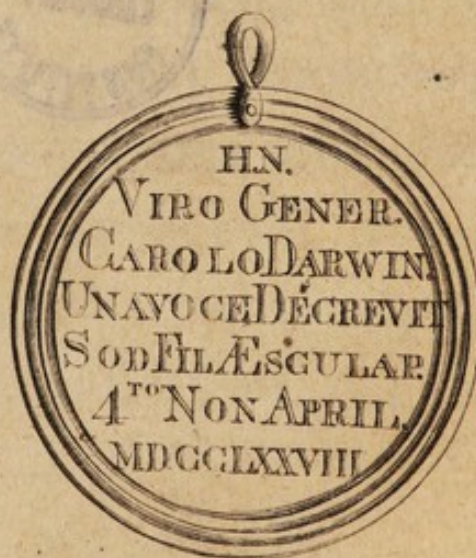
*F* BETWEEN *Obs.*

MUCAGINOUS and PURULENT

MATTER.

A N D

An Account of the RETROGRADE MOTIONS  
of the ABSORBENT VESSELS of Animal  
BODIES in some Diseases.



LICHFIELD:

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71096

# EXPERIMENTS

Relating to the

BETWEEN

MUCAGINOUS and PUKULENT

## MATTER.

A. H. C.

An Account of the Retrograde Motions

of the Apparatus of the Viscera of Animals

Bodies in Motion



Printed for J. Jackson, T. Cadell, & Co.  
The Strand, London; and W. Groom,  
Yorkshire, Newcastle, 1864.

Dr. ANDREW DUNCAN.

*S I R,*

**T**H E S E pages are with justice dedicated to you, whose friendship was so dear to the departed Author; and by whose example and incitement he pursued the study of medicine with such uncommon ardor and success---They are justly dedicated by me, who revere the incessant endeavours, you exert, for the advancement of medical knowledge by your ingenious lectures and publications; and the perpetual humanity, you exhibit, in conducting the dispensary for the relief of the indigent sick.

PERMIT me to add, that I shall ever esteem myself under the greatest



obligation to you, not only for the disinterested friendship you had for my poor CHARLES during his life; but for that unexampled mark of affection, you shewed for his remains, beyond the hospitality of former times! in offering a place for them in the vault of your family.

YOUR friendly sympathy will drop another tear on this recital, for a youth, who might have been, had Heaven assented, an ornament to medicine, to philosophy, and to mankind!--

SUCCESS and happiness attend your virtues! Farewell.

E. DARWIN.

*Lichfield, 1780.*

# EXPERIMENTS

ESTABLISHING A CRITERION

BETWEEN

MUCAGINOUS AND PURULENT

MATTER.

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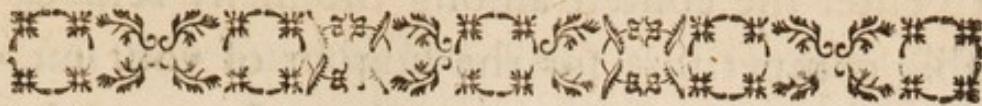
Insignemque meo capiti petere inde coronam  
Unde prius nulli velarint tempora DOCTI.

---



*Advertisement.*

THE ÆSCULAPIAN society at  
*Edinburgh*, soon after their esta-  
blishment, offer'd a gold medal, for  
the best criterion between *pus* and  
*mucus* ; and, in March 1778, con-  
fer'd it on the late Mr. CHARLES  
DARWIN, for the following differ-  
tation.



# EXPERIMENTS

ESTABLISHING A CRITERION

BETWEEN

MUCAGINOUS AND PURULENT

MATTER.

TO make any observations on the utility of a criterion to distinguish Pus from Mucus would be superfluous ; as your adjudging it worthy to be appointed a subject for your premium, sufficiently demonstrates your ideas of its importance ; and to bestow much time in shewing the fallacy of all the commonly received tests, would be equally unnecessary to you, who must have so often experienced it.



I shall make no apology for my thus daring to enter the contest among the many respectable competitors for the honour of your medical meed, since your excellent plan contains a general invitation ; and I am convinced, if my attempt should fail, this “ rudis indigestaque moles ” will be consigned to oblivion ; and that should the contrary, which I have small reason to expect, happen, your approbation would stamp a value on this paper much above its real merit.

FROM experiments alone it is, that we can expect to receive any information on this subject ; I shall, therefore, cursorily mention what have been commonly received as diagnostics ; then describe the experiments I have made ; and, lastly, conclude with some observations and deductions, which may justly be drawn from them.

THE first, and the most common test, is the appearance of the expectorated matter received into water, which is supposed to swim if Mucus, and to sink if Pus ; the fallacy of this is suspected, when we know, that the Mucus of those parts, where air has not access to it, always sinks, as of the urethra and stomach ; but is proved beyond a doubt by  
 extract-



extracting the air from pulmonary Mucus, since after that it will (*a*) sink ; add to this, that Mucus and Pus may be mixed in such proportions, and so united to air bubbles, as to float upon the surface of water. This test, as at present used, is not so good as it was in the method originally advised by (*b*) Hippocrates ; he ordered, that the expectorated matter should be received into sea-water, which from its greater specific gravity, will be a more probable test of the presence of Pus ; but as Van Swieten justly observes, (*c*) the fallaciousness of this test fully appears, from some part of the same expectorated matter swimming, and some sinking ; and from that, which had swam in the morning, if allowed to remain in the same circumstances, sinking in the evening. Was any thing more required to overturn the use of this, as a proof of the presence of Pus ; I think, we might lay considerable stress on the contradictions, which occur, even in the works of the father of medicine, on this subject ; in the passage above quoted, he mentions the sinking in sea-water  
as

(*a*) Fordice de catarrho. Exp. 16. Thes. Edinens. 1758.

(*b*) Coac. prænot. No. 435. Tom. I. p. 565. Editionis Varder, Leiden, 1665.

(*c*) Comment. in Boernaav. Aph. Tom. IV. p. 71. Aph. 3206.



as fatal; and in another, the frothyneſs of the ſputum is enumerated as a fatal ſign. (*d*)

SOME have paid much attention to the colour of the matter expectorated, as Hippocrates does, in the following paſſages; if, ſays he, long after the commencement of the pain of the breaſt, the expectorated matter be yellow, or tawny, or mix'd, it is bad; if it is ſimply yellow, it is alſo dangerous; that which is green, is alſo bad; likewise ſuch as is pale and frothy: but if it is quite black, it is moſt (*e*) dangerous. And he deſcribes the good Pus, (*f*) as white, ſmooth, and uniform; whilſt Celfus, however, is of a contrary opinion to Hippocrates, and ſays, *Quanto magis miſtos neque inter ſe diductos colores habet tanto deterius.* Lib. 2. Cap. 8. but every perſon, who has with any attention obſerved the common terminations of a catarrh or coryza, will have ſeen almoſt the whole of theſe ſymptoms occur from the changes of the mucus. The black appearance ſeems to be the only unuſual one, and that may probably (if it is ſo fatal as repreſented) be a ſymptom of incipient gangrene; tho'

(*d*) Coac. præno. t207. Tom. I. p. 562.

prænot. XIII. 7. Tom. I. p. 458.

(*e*) Prænot. XIII. 7. Tom. I. p. 458.

(*f*) Prædiſtor. Lib. 2. Sect. 12. No. 2. Tom. I. p. 457.



tho' I have known a person, who has for some years spit up every morning a small quantity of black matter, and yet has enjoyed a perfect state of health; a bluish kind of matter is very frequently thus spit up.

H I P P O C R A T E S, and some others have also ennumerated the foetid smell of such matter as a bad symptom; either when expectorated or burnt on (*g*) hot coals; my reasons for not paying implicit credit to the first, are, that P U S has often no (*b*) bad smell; and that disagreeable smells frequently occur at some period of a common catarrh or coryza. With respect to the second, I am fully authorized to doubt by Van Swieten, when he gives the opinion of (*i*) Benedict: That the taste of expectorated matter is of no great importance, is evinced, because some affirm a saline taste to be bad, some a sweet, and others a disagreeable one not to be discribed.

H E C T I C fever may be considered as a criterion of the presence of P U S; but independent of the reasons, which might be drawn from the arguments of Mr. John Hunter,  
( who

(*g*) Sect. 5. Apho. 11.

(*b*) Hendy, de secretion glandulari. Thes. Edin. 1774.  
Experim. I.

(*i*) Vol. 4. p. 73.



( who has endeavoured to prove, that the hectic fever in ulcers depends alone on the loss of matter from the general system, and the irritation of the part, ) I think this test will often fail us, in cases where a distinction is of the utmost importance : As when a patient has catarrhal or phthifical symptoms, and at the same time a white swelling of a joint, or other considerable topical affection ; the state of the lungs may merit some attention, previous to the determining on any operation.

**T H U S** having mentioned the commonly received modes of distinction, and their fallacy, I shall relate the experiments from whence I have endeavour'd to deduce a new, and, I hope, a more certain test than any of the former. They are numbered, as are the observations dispersed in them, for the convenience of future reference.

## EXPERIMENT, I.

## I. EXPERIMENT.

To a dram of very fœtid *purulent matter*, obtained from a common abscess, fifty drops of *vitrolic acid* were added: The acid sunk to the bottom, while the purulent matter kept in the upper part of the glass; but, on the addition of about two ounces of water, the whole formed a turbid white *uniform mixture*.

## II. EXPERIMENT.

ABOUT fifty drops of *vitrolic acid* were added to a dram of *mucus*, coughed up from the lungs, and discharged from the nose; the acid soon dissolved the greatest part of the *mucus*, but, on a proportion of water being added to the mixture, the *mucus*, which had been dissolved, *swam on the top* of the fluid.

## III. EXPERIMENT.

To fifty drops of *vitrolic acid*, diluted with about an ounce of water, were added about two drams of pure *mucus*, coughed up from the lungs, and collected from the nose; notwithstanding repeated agitation, they could not be made to unite;—almost the whole *mucus* continued *afloat at the top*; and the



watery fluid below lost very little of its transparency, acquiring only a slight bluish cast.

## OBSERVATIONS, on I. II. and III.

### EXPERIMENTS.

IT will sometimes happen, that mucus may be separated in the form of a slight sediment, on adding water, or enter into the weak acid; but then, in both cases, it is in large flocci, and cannot be made to form an uniform turbid solution.

## IV. EXPERIMENT.

ON the addition of about two drams of *fætid purulent matter*, to fifty drops of *vitriolic acid*, diluted with about an ounce of water, an *uniform turbid fluid* of a whitish colour was formed, and which exactly resembled that mentioned in the first experiment.

## V. EXPERIMENT.

ABOUT two drams of very *fætid purulent matter* were combined by agitation with as much *mucus* from the nose and lungs. These two fluids were so blended together, that no difference could be perceived. To this was added a mixture of fifty drops of *vitriolic*

*acid* with two ounces of water. In a short time the fluid in the under part of the glass had the same turbid appearance as in experiment first and fourth, while the mucus apparently deprived of purulent matter swam on the top.

## VI. OBSERVATION.

ALL the five glasses mentioned in the preceding experiments, were allowed to remain at rest about half an hour, during that time the glasses mentioned in experiments, second and third, which contained the mucus, remained unchanged. But the first, fourth and fifth deposited each a white coloured sediment in considerable quantity; the fluid above the sediment in first and fourth had become somewhat more transparent, but still continued of a white colour. In the fifth the mucus continued to float on the surface as before.

## VII. EXPERIMENT.

THE *mucus* collected from the top of the fifth was put into another glass, and an ounce of water impregnated with fifty drops of *caustic alkaline* lixivium (*k*) was added; but *no union* or solution could be produced even by the aid of triture.

## VIII.

(*k*) Pharmacop. Edinens.



## VIII. EXPERIMENT.

FIFTY drops of the *alkaline lixivium* were added to each of the phials No. 1, 2, 3, and 4, when 1 and 4 were agitated, the white sediment was again diffused in them; but, in a short time it subsided, leaving the liquor above of the same whitish colour as before the addition; the agitation of 2 and 3 had no effect in producing any union farther than before; the mucus in both still continuing to float on the surface.

## IX. EXPERIMENT.

THE *mucus* used in 7 and 8 was again put into a glass by itself, and about two drams of *caustic alkaline lixivium* added to it. In this by the aid of agitation it was soon *completely dissolved*, losing entirely its viscosity, and leaving a froth on the top.

## X. EXPERIMENT.

Two ounces of water added to the solution of *mucus in alkali* No. 9, produced no decomposition; and had the effect only of giving the fluid a greater transparency; no change was produced on this fluid, when allowed to remain at rest for the space of half an



an hour, except that the froth on the surface disappeared.

## XI. EXPERIMENT.

To half the liquor of 10, about a dram of *nitrous acid* was added; the mixture became of a more turbid and white colour, but no deposition took place.

## XII. EXPERIMENT.

A similar change of colour took place on the addition of a certain quantity of the *murialic acid* to the remaining half of No. 10. But, even after the mixture had stood for half an hour, no sediment had fallen to the bottom of the vessel.

## XIII. EXPERIMENT.

WHEN the white coloured liquor on the surface was poured off from No. 1, 4, and 5, each of which deposited a sediment resembling *pus*. The sediments were again observed to emit a very fœtid smell. To these sediments collected in one glass, about two drams of *nitrous acid* were added. The mixture for a little time appeared uniform, but in a few minutes a thick white cloud was observed



observed on the top of it, the liquor below being of a wheyish colour.

#### XIV. EXPERIMENT.

To the liquor, No. 13, was added about two ounces of water: The cloud which before swam on the surface, was on slight agitation, uniformly diffused through it; and when the mixture was allowed to remain at rest for a short time, a sediment fell to the bottom exactly resembling that which had appeared in observation 6, to have happened in experiment 1, 4, and 5; and this sediment, when the fluid above was poured off, had also a foetid smell.

#### XV. EXPERIMENT.

Two ounces of viscid *mucus*, blown from the nose, were put into a glass, to these were added two drams of *alkaline lixivium*, a complete solution soon took place; and upon the addition of two ounces of water, there did not occur any separation. The glass was allowed to remain at rest for the space of a fortnight, and during that time a very slight separation only had taken place; which consisted solely of light flakes of mucus swimming in



in the water; but nothing appeared in the bottom of the glass, which could in the least degree deserve the name of sediment. Previous to making this and the preceding experiments, it is necessary to examine the water to be used, as I once was surprized to see a considerable cloud, and then a sediment occur on adding water to mucus and alkaline lixivium; but I soon discovered that this was owing to the impurity of the water added. Also in conducting this experiment, we must let the mucus and the alkaline lixivium remain at least an hour united, before we add the water; and if we observe any mucus undissolved by the alkali, it should be removed before we add the water.

N. B. In some repetitions of these experiments I have seen a slight cloud in the space of twelve hours, but never immediately.

## XVI. EXPERIMENT

Two drams of *purulent matter*, obtained in the opening of a large abscess, were put into a glass, and agitated with about as much of the *alkaline caustic lixivium*; in a short time there was an intimate mixture, and the pus seem'd to be dissolved. But upon the addition



tion of water a separation took place, and in a few minutes a considerable sediment, apparently of purulent matter, sunk to the bottom. When allowed to remain at rest, it continued in this condition for several days : But at the end of a fortnight, what had at first appeared as a sediment floated in the surrounding fluid.

N. B. It will some times be difficult to unite the pus and alkali.— See Experiment the 32.

## XVII. EXPERIMENT.

To a small quantity of *coagulable lymph*, obtained by washing away the red globules from some crassamentum of blood, I added about fifty drops of *acid of vitriol* ; which changed the colour of the lymph to a red-dish brown, but did not apparently dissolve any of it.

## XVIII. EXPERIMENT.

To No. XVII. about an ounce of water was added without producing any observable change in the fluid, but the lymph after this seemed more dense than before Experiment the XVII.

## XIX.



## XIX. EXPERIMENT.

ONE dram of *caustic lixivium* took five hours to dissolve the greater part of four grains of *coagulable lymph*; the remainder of the lymph had acquired a brown red colour, and was softer than before it was added to the alkali.

## XX. EXPERIMENT.

WATER added to XIX. produced a separation of a whitish sediment.

## XXI. EXPERIMENT.

EQUAL parts of *serum* and *caustic lixivium* easily united, and suffered no change on the addition of eight or ten times their quantity of water; tho after standing some hours the mixture deposited a slight sediment.

## XXII. EXPERIMENT.

TWENTY five drops of *vitriolic acid* added to one dram of *serum* converted it into a whitish curdled matter.



## XXIII. EXPERIMENT.

WATER being added to No. 22, the whitish curdled matter was easily dispersed through it; but soon formed a cloud near the top of the glass: On the addition of more serum to this mixture, it was converted into a similar matter.

## XXIV. EXPERIMENT.

ONE dram of *nitrous acid*, after some time, dissolved 3 grains of *coagulable lymph*, with fumes and froth.

## XXV. EXPERIMENT.

WATER added to this produced a dilute *green fluid*.

## XXVI. EXPERIMENT.

*Acid of nitre* dissolved *mucus*, and with water occasioned a turbid dirty coloured fluid.

## XXVII. EXPERIMENT.

A saturated solution of *corrosive sublimate* coagulated *mucus* into an harder white material.



## XXVIII. EXPERIMENT.

(THIS and the following experiments were tried on Pus from a suppurated mamma. )  
*Pus* diffused readily thro' *pure water*, forming a white milky opaque fluid, but after some length of time fell down to the bottom of the glass ; where it had no great viscosity ; the fluid above it was for some hours of a reddish yellow colour, but became at last colourless ; by agitation the pus was again diffusible, but did not remain so long suspended as the first time ; and the fluid was immediately after its precipitation clear and colourless.

## XXIX. EXPERIMENT.

*Acid of vitriol in small quantity* exhibited the same appearances with this *pus* from a suppurated mama, as in No. 1, &c.

## XXX. EXPERIMENT.

*Acid of vitriol in large quantity* dissolved it, and became black ; on adding four or five times its quantity of water it grew turbid ; and in an hour let fall a copious brownish heavy sediment, the fluid above being nearly colourless.

## XXXI.



## XXXI. EXPERIMENT.

*Nitrous acid* in considerable quantity dissolved it with great froth; became *green*, and kept its froth; water added rendered it very turbid and milky; and a copious white sediment soon fell to the bottom, the fluid above remaining green, and having still the froth.

## XXXII. EXPERIMENT.

*Caustic alkaline* lixivium would not dissolve it, for it remained viscid at the bottom of a glass of lixivium, and nearly separable for the space of twenty four hours; on adding water to this a semipellucid matter fell to the bottom, (which was more viscid and tough, and readily drawing into strings, than the pus before the addition,) and could not be separated into parts; nor in the least diffused thro' the water. See 15, 18, and 34.

N. B. This experiment I repeated five times with the same event, I used great agitation, a lixivium of double (1) strength, and different proportions of it to the pus, and water to the compound.

(1) i. e. Containing double the usual quantity of caustic alkali in a given measure.

## XXXIII.



## XXXIII. EXPERIMENT.

A saturated solution of *corrosive sublimate* produced no evident change ; but allowed on the addition of water a milky diffusion ; in some little time a sediment fell, and left a fluid. See 28.

## XXXIV. EXPERIMENT.

SOME *caustic alkaline* lixivium; added to a mixture of pus and water, from its being milky and opaque made it dirty coloured and semipellucid ; and produced after a time a slight tough precipitate, the fluid above remaining muddy, and not becoming clear on standing. See 28.

## XXXV. EXPERIMENT.

*Pus* was diffused thro' a saturated solution of *sea salt* in water, but soon deposited in the form of a tough precipitate. See 28.

FROM



FROM the above related experiments I think the following conclusions may justly be deduced.

1. Pus and mucus are both soluable in the vitriolic acid, tho in very different proportions, pus being much the less soluable. 2, 30, 1, 29.

2. The addition of water to either of these compounds decomposes it; the mucus thus separated, either swims on the mixture, or forms large flocci in it; whereas the pus falls to the bottom, and forms on agitation a uniform turbid mixture. 2, 1. 6, 30, 5, &c.

3. Pus is diffusible thro' a diluted vitriolic acid, tho mucus is not; the same occurs with water, or a solution of sea salt. 3, 4, 5, 28, 35.

4. Nitrous acid dissolves both pus and mucus; water added to the solution of pus produces a precipitate; and the fluid above becomes clear and green; while water and the solution of mucus form a dirty coloured fluid. 31, 24, 5.

5. Alkaline



5. Alkaline lixivium dissolves ( tho sometimes with difficulty ) mucus, and generally pus.

6. Water precipitates pus from such a solution, but does not mucus. 9, 15, 16.

7. Where alkaline lixivium does not dissolve pus, it still distinguishes it from mucus; as it then prevents it's diffusion thro' water. 32.

8. Coagulable lymph is neither soluble in diluted nor concentrated vitriolic acid. 17, 18.

9. Water produces no change on a solution of serum in alkaline lixivium, until after long standing, and then only a very slight sediment appears. 21.

10. Corrosive sublimate coagulates mucus, but does not pus.

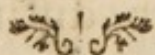
FROM the above experiments it appears, that *strong vitriolic acid and water*; *diluted vitriolic acid*; and *caustic alkaline lixivium and water* will serve to distinguish P U S from M U C U S; that the vitriolic acid can separate it from coagulable lymph, and alkaline lixivium from serum.

AND



AND hence when a person has any expectorated material, the composition of which he wishes to ascertain, let him dissolve it in vitriolic acid, and in caustic alkaline lixivium; and then add pure water to both solutions: and if there is a fair precipitation in each, he may be assured that some P u s is present; if in neither a precipitation occurs, it is a certain test, that the material is entirely Mucus: if the material cannot be made to dissolve in alkaline lixivium by time and trituration, we have also reason to believe that it is P u s.

THUS having finished the task I had undertaken, I hope, should I fail of obtaining the honour of your medal, these experiments may be of some service, as corroborating any better test, which may be presented to you; should I succeed, I need not say, that gratitude will always bind me to the Æsculapian society, and that I shall be happy in having contributed my mite to ascertain an important circumstance in the practice of medicine.



And

AN ACCOUNT  
OF THE  
RETROGRADE MOTIONS  
OF THE  
ABSORBENT VESSELS  
OF  
ANIMAL BODIES  
IN SOME DISEASES.



## *Advertisement.*

**T**H E following dissertation was written in classical latin, by the late Mr. CHARLES DARWIN, and was designed for his inaugural thesis: it is here faithfully translated into english.

C O N T E N T S.

I. *ACCOUNT of the absorbent system.*

II. *The valves of the absorbent vessels may suffer their fluids to regurgitate in some diseases.*

III. *Communication from the alimentary canal to the bladder by means of the absorbent vessels.*

IV. *The phænomena of diabætes explained.*

V. *The phænomena of dropsies explained.*

VI. *Of cold sweats.*

VII. *Translations of matter, of chyle, of milk, of urine, operation of purging drugs applied externally.*

VIII.



C O N T E N T S.

*VIII. Circumstances by which the fluids, that are effused by the retrograde motions of the absorbent vessels, are distinguished.*

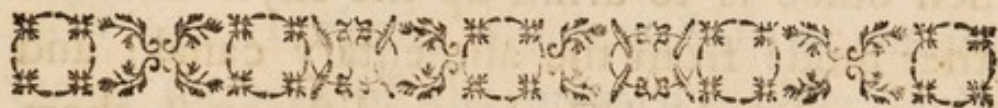
*IX. Synopsis of diseases, which originate from the retrograde motions of the absorbent vessels.*

*X. Objections answered.*

*XI. The causes, which induce the retrograde motions of animal vessels, and the medecines by which the natural motions are restored.*

AN ACCOUNT

AN ACCOUNT  
OF THE  
RETROGRADE MOTIONS  
OF THE  
ABSORBENT VESSELS  
OF  
ANIMAL BODIES  
IN SOME DISEASES.



THE progress of our knowledge in the art of healing, has frequently been retarded by idle theories; in which the laws of animal life have been compared with those of mechanics or of chemistry. In the subsequent pages I have endeavoured to avoid this error, by comparing animal facts with other animal facts; and that without introducing any chemical or mechanical allusions; as this stricter kind of analogy is, perhaps, the only safe foundation for medical reasoning.



# I. *Account of the absorbent system.*

1. **T**HE absorbent system of vessels in animal bodies consists of several branches, differing in respect to their situations, and to the fluids which they absorb.

THE *intestinal absorbents* open their mouths on the internal surfaces of the intestines; their office is to drink up the chyle and the other fluids from the alimentary canal; and they are term'd *lacteals*, to distinguish them from the other absorbent vessels, which have been term'd *lymphatics*.

THOSE, whose mouths are dispersed on the external skin, imbibe a great quantity of water from the atmosphere, and a part of the perspirable matter, which does not evaporate, and are term'd *cutaneous absorbents*.

THOSE, which arise from the internal surface of the bronchia, and which imbibe moisture from the atmosphere, and a part of the bronchial mucus, are call'd *pulmonary absorbents*.

THOSE,



THOSE, which open their innumerable mouths into the cells of the whole cellular membrane; and whose use is to take up the fluid, which is pour'd into those cells, after it has done it's office there; may be call'd *cellular absorbents*.

THOSE, which arise from the internal surfaces of the membranes, which line the larger cavities of the body, as the thorax, abdomen, scrotum, pericardium, take up the mucus pour'd into those cavities; and are distinguish'd by the names of their respective cavities.

WHILST those, which arise from the internal surfaces of the urinary bladder, gall-bladder, salivary ducts, or other receptacles of secreted fluids, may take their names from those fluids; the thinner parts of which it is their office to absorb: as *urinary, bilious, or salivary absorbents*.

2. MANY of these absorbent vessels, both lacteals and lymphatics, like some of the veins, are replete with *valves*: which seem designed to assist the progress of their fluids, or at least to prevent their regurgitation; where they are subjected to the intermitted pressure of the muscular, or arterial actions in their neighbourhood.

THESE



THESE valves do not however appear to be necessary to all the absorbents, any more than to all the veins; since they are not found to exist in the absorbent system of fish; according to the discoveries of the ingenious, and much lamented Mr. HEWSON. *Philos. Transact.* V. 59, Enquiries into the lymph. syst. p. 94.

3. THESE absorbent vessels are also furnished with glands, which are called *conglobate glands*; whose use is not at present sufficiently investigated; but it is probable that they resemble the conglomerate glands both in structure and in use, except that their absorbent mouths are for the convenience of situation placed at a greater distance from the body of the gland. The conglomerate glands open their mouths immediately into the sanguiferous vessels, which bring the blood, from whence they absorb their respective fluids, quite up to the gland: but these conglobate glands collect their adapted fluids from very distant membranes, or cysts, by means of mouths furnish'd with long necks for this purpose; and which are call'd *lacteals*, or *lymphatics*.

4. THE



4. THE fluids thus collected from various parts of the body, pass by means of the thoracic duct, into the *left subclavian*, near the jugular vein; except, indeed, that those collected from the right side of the head and neck, and from the right arm, are carried into the right subclavian vein: and sometimes even the lymphatics, from the right side of the lungs, are inserted into the right subclavian vein; whilst those of the left side of the head, open but just into the summit of the thoracic duct.

5. IN the absorbent system there are many *anastomoses of the vessels*, which seem of great consequence to the preservation of health. These anastomoses are discovered by dissection, to be very frequent between the intestinal and urinary lymphatics, as mentioned by Mr. *Hewson*, (Phil. Trans. v. 58).

6. NOR do all the intestinal absorbents seem to terminate in the *thoracic duct*, as appears from some curious experiments of Dr. *Monro*, who gave madder to some animals, having previously put a ligature on the thoracic duct, and found their bones, and the serum of their blood, coloured red.



*II. The valves of the absorbent system may suffer their fluids to regurgitate in some diseases.*

1. **T**HE many valves, which occur in the progress of the lymphatic and lacteal vessels, would seem insuperable obstacles to the regurgitation of their contents. But as *these valves are placed in vessels, which are indued with life, and are themselves indued with life also*; and are very irritable into those natural motions, which absorb, or propel the fluids they contain; it is possible, in some diseases, where these valves or vessels are stimulated into unnatural exertions, or are become paralytic, that during the diastole of the part of the vessel to which the valve is attached, the valve may not so completely close, as to prevent the relapse of the lymph or chyle. This is rendered more probable, by the experiments of injecting mercury, or water, or suet, or by blowing air down these vessels; all which pass the valves very easily, contrary to the natural course of their fluids, when the vessels are thus a little forcibly dilated,



dilated, as mentioned by Dr. *Haller*, Elem. Physiol. l. 3, f. 4.

2. THE mouths of the lymphatics seem to admit water to pass through them after death, the inverted way, easier than the natural one; since an inverted bladder readily lets out the water with which it is filled; whence it may be inferred, that there is *no obstacle at the mouths of these vessels* to prevent the regurgitation of their contained fluids.

I WAS induced to repeat this experiment, and having accurately tied the ureters and neck of a fresh ox's bladder, I made an opening at the fundus of it; and then, having turned it inside outwards, filled it half full with water, and was surprized to see it empty itself so hastily. I thought the experiment more apposite to my purpose by suspending the bladder with its neck downwards, as the lymphatics are chiefly spread upon this part of it; as shewn by Dr. *Watson*, Philos. Transf. v. 59, p. 392,

3. IN some diseases, as in the diabætes and scrophula, it is probable *the valves themselves are diseased*, and are thence incapable of preventing the return of the fluids they



should support. Thus the valves of the aorta itself have frequently been found schirrous, according to the dissections of Mons. *Lieutand*, and have given rise to an interrupted pulse, and laborious palpitations, by suffering a return of part of the blood into the heart. Nor are any parts of the body so liable to schirrosity as the lymphatic glands and vessels, inasmuch that their schirrosities have acquired a distinct name, and been termed schrophula.

4. THERE are valves in other parts of the body, analogous to those of the absorbent system, and which are liable, when diseased, to regurgitate their contents: thus the upper and lower *orifices of the stomach are closed by valves*, which, when too great quantities of warm water have been drank with a design to promote vomiting, have sometimes resisted the utmost efforts of the abdominal muscles, and diaphragm: yet, at other times, the upper valve, or cardia, easily permits the evacuation of the contents of the stomach; whilst the inferior valve, or pylorus, permits the bile, and other contents of the duodenum, to regurgitate into the stomach.

5. THE



5. THE *valve of the colon* is well adapted to prevent the retrograde motion of the excrements; yet, as this valve is possessed of a living power, in the iliac passion, either from spasm, or other unnatural exertions, it keeps itself open, and either suffers, or promotes the retrograde movements of the contents of the intestines below; as in ruminating animals the mouth of the first stomach seems to be so constructed, as to facilitate or assist the regurgitation of the food; the rings of the *œsophagus* afterwards contracting themselves in inverted order. *De Haen*, by means of a syringe, forced so much water into the rectum intestinum of a dog, that he vomited it in a full stream from his mouth; and in the iliac passion above mentioned, excrements and clyster are often evacuated by the mouth.

6. THE *puncta lacrymalia*, with the lacrymal sack and nasal duct, compose a complete gland, and much resemble the intestinal canal: the *puncta lacrymalia* are absorbent mouths, that take up the tears from the eye, when they have done their office there, and convey them into the nostrils; but when the nasal duct is obstructed, and the



the lacrymal sack distended with its fluid, on pressure with the finger the mouths of this gland (*puncta lacrymalia*) will readily disgorge the fluid, they had previously absorbed, back into the eye.

7. As the capillary vessels receive blood from the arteries, and separating the mucus, or perspirable matter from it, convey the remainder back by the veins; these *capillary vessels are a set of glands*, in every respect similar to the secretory vessels of the liver, or other large congeries of glands. The beginnings of these capillary vessels have frequent anastomoses into each other, in which circumstance they are resembled by the lacteals; and like the mouths or beginnings of other glands, they are a set of absorbent vessels, which drink up the blood which is brought to them by the arteries, as the chyle is drank up by the lacteals; for the circulation of the blood through the capillaries is proved to be independent of arterial impulse; since in the blush of shame, and in partial inflammations, their action is increased, without any increase of the motion of the heart.



8. YET not only the mouths, or beginnings of these anastomosing capillaries are frequently seen by microscopes, to regurgitate some particles of blood, during the struggles of the animal; but *retrograde motion of the blood*, in the veins of these animals, from the very heart to the extremity of the limbs, is observable, by intervals, during the distresses of the dying creature, Haller. Elem. Physiol. t. i, p. 216. Now, as the veins have perhaps all of them a valve, somewhere between their extremities and the heart, here is ocular demonstration of the fluids in this diseased condition of the animal, repassing through venous valves: and it is hence highly probable, from the strictest analogy, that if the course of the fluids, in the lymphatic vessels, could be subjected to microscopic observation, they would also, in the diseased state of the animal, be seen to repass the valves, and the mouths of those vessels, which had previously absorbed them, or promoted their progression.

### III. Communication



### III. *Communication from the alimentary canal to the bladder, by means of the absorbent vessels.*

**M**ANY medical philosophers, both ancient and modern, have suspected that there was a nearer communication between the stomach and the urinary bladder, than that of the circulation: they were led into this opinion from the great expedition with which cold water, when drank to excess, passes off by the bladder; and from the similarity of the urine, when produced in this hasty manner, with the material that was drank.

THE former of these circumstances happens perpetually to those, who drink abundance of cold water, when they are much heated by exercise; and to many at the beginning of intoxication.

OF the latter, many instances are recorded by *Etmuller*, t. xi, p. 716. where simple water, wine, and wine with sugar, and emulsions,



emulsions, were returned, by urine, unchanged.

THERE are other experiments, that seem to demonstrate the existence of another passage to the bladder, besides that through the kidneys. Thus Dr. *Kratzenstein* put ligatures on the ureters of a dog, and then emptied the bladder by a catheter; yet in a little time the dog drank greedily, and made a quantity of water (*Disputat. Morbor. Halleri. t. iv, p. 63*). A similar experiment is related in the philosophical transactions, with the same event, (No. 65, 67, for the year 1670).

ADD to this, that in some morbid cases the urine has continued to pass, after the supuration or total destruction of the kidneys; of which many instances are referred too in the *El. Physiol. t. vii, p. 379*, of Doctor *Haller*.

FROM all which it must be concluded, that some fluids have passed from the stomach or abdomen, without having gone through the sanguiferous circulation: and as the bladder is supplied with many lymphatics,



phatics, as described by Dr. *Watson*, in the *Philos. Transf.* v. 59, p. 392 ; and as no other vessels open into it besides these and the ureters, it seems evident, that the unnatural urine, produced as above described, when the ureters were tied, or the kidneys obliterated, was carried into the bladder by the retrograde motions of the urinary branch of the lymphatic system.

THE more certainly to ascertain the existence of another communication between the stomach and bladder, besides that of the circulation, the following experiment was made, to which I must beg your patient attention :—A friend of mine (*June* 14th, 1772) on drinking repeatedly of cold small punch, till he began to be intoxicated, made a quantity of colourless urine. He then drank about two drams of nitre dissolved in some of the punch, and eat about twenty stalks of boiled asparagus : on continuing to drink more of the punch, the next urine that he made was quite clear, and without smell ; but in a little time another quantity was made, which was not quite so colourless, and had a strong smell of the asparagus : he  
then



then lost about four ounces of blood from the arm.

THE smell of asparagus was not at all perceptible in the blood, neither when fresh taken, nor the next morning, as myself and two others accurately attended to; yet this smell was strongly perceived in the urine, which was made just before the blood was taken from his arm.

SOME bibulous paper, moistened in the serum of this blood, and suffered to dry, shewed no signs of nitre by its manner of burning. But some of the same paper, moistened in the urine, and dried, on being ignited, evidently shewed the presence of nitre. This blood and the urine stood some days exposed to the sun in the open air, till they were evaporated to about a fourth of their original quantity, and began to stink: the paper, which was then moistened with the concentrated urine, shewed the presence of much nitre by its manner of burning; whilst that moistened with the blood, shewed no such appearance at all.

HENCE it appears, that certain fluids at the beginning of intoxication, find another



passage to the bladder, besides the long course of the arterial circulation; and as the intestinal absorbents are joined with the urinary lymphatics by frequent anastomoses, as *Hewson* has demonstrated; and as there is no other road, we may justly conclude, that these fluids pass into the bladder by the urinary branch of the lymphatics, which has its motions inverted during the diseased state of the animal.

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#### IV. The



*IV. The phænomena of the diabætes explained, and of some diarrhæas.*

THE phænomena of many diseases are only explicable from the retrograde motions of some of the branches of the lymphatic system; as the great and immediate flow of pale urine in the beginning of drunkenness; in hysteric paroxysms; from being exposed to cold air; or to the influence of fear or anxiety.

BEFORE we endeavour to illustrate this doctrine, by describing the phænomena of diseases, we must premise one circumstance; that all *the branches of the lymphatic system have a certain sympathy with each other*, in-somuch that when one branch is stimulated into unusual kinds, or quantities of motion, some other branch has its motions either increased, or decreased, or inverted at the same time. This kind of sympathy can only be proved by the concurrent testimony of numerous facts, which will be related in the course of this dissertation: I shall only  
add



add here, that it is probable, that this sympathy does not depend on any communication of nervous filaments, but on habit; owing to the various branches of this system having frequently been stimulated into action at the same time. This habit of acting, either together or in succession, is termed by the metaphysicians, *association*; and in this manner not only many of the movements of the body, but the ideas of the mind are connected together, as appears from the celebrated writings of *Locke* and *Hartley*; and which I shall endeavour further to illustrate at some future time, if Heaven should grant me life and ability!

THERE are a thousand instances of involuntary motions associated in this manner; as in the act of vomiting, while the motions of the stomach and œsophagus are inverted, the pulsations of the arterial system by a certain sympathy become weaker; and when the bowels, or kidneys are stimulated by poison, a stone, or inflammation, into more violent action; the stomach and œsophagus by a sympathy unexplained invert their motions.



1. WHEN any one drinks a moderate quantity of vinous spirit, the whole system acts with more energy by consent with the stomach and intestines, as is seen from the glow on the skin, and the increase of strength and activity; but when a greater quantity of this inebriating material is drank, at the same time that the lacteals are excited into greater action to absorb it; it frequently happens, that the urinary branch of absorbents, which is connected with the lacteals by many anastomoses, inverts its motions, and a great quantity of pale unanimalized urine is discharged. By this wise contrivance too much of an unnecessary fluid is prevented from entering the circulation—This may be called the *drunken diabætes*, to distinguish it from the other temporary diabætes, which occur in hysteric diseases, and from continued fear or anxiety.

2. IF this idle ingurgitation of too much vinous spirit be daily practiced, the urinary branch of absorbents at length gains an habit of inverting its motions, whenever the lacteals are much stimulated; and the whole or a great part of the chyle is thus daily carried to the bladder without entering the circula-



circulation, and the body becomes emaciated. This is one kind of chronic diabætes, and may be distinguished from the others by the taste and appearance of the urine ; which is sweet, and the colour of whey, and may be termed the *chyliferous diabætes*.

3. MANY children have a similar deposition of chyle in their urine, from the *irritation of worms* in their intestines, which stimulating the mouths of the lacteals into unnatural action, the urinary branch of the absorbents becomes inverted, and carries part of the chyle to the bladder : part of the chyle also has been carried to the iliac and lumbar glands, of which instances are recorded by *Haller*, t. vii, 225, and which can be explained on no other theory : but the dissections of the lymphatic system of the human body, which have yet been published, are not sufficiently extensive for our purpose ; yet if we may reason from comparative anatomy, this translocation of chyle to the bladder, is much illustrated by the account given of this system of vessels in a turtle, by Mr. *Hewson*, who observed, “ That the lacteals near the root of the mesentery anastomose, so as to form a net-work, from which several  
large



large branches go into some considerable lymphatics lying near the spine ; and which can be traced almost to the anus, and particularly to the kidneys. *Philos. Trans.* v. 59, p. 199--enquiries p. 74.

4. At the same time that the urinary branch of absorbents, in the beginning of diabætes, is excited into inverted action, the cellular branch is excited by the sympathy above-mentioned, into more energetic action ; and the fat, that was before deposited, is re-absorbed, and thrown into the blood vessels ; where it floats, and was mistaken for chyle, 'till the late experiments of the ingenious Mr. *Hewson*, demonstrated it to be fat.

THIS appearance of what was mistaken for chyle in the blood, which was drawn from these patients, and the obstructed liver, which very frequently accompanies this disease, seems to have led Dr. *Mead* to suspect the diabætes was owing to a defect of sanguification ; and that the schirrosity of the liver was the original cause of it : but as the schirrhous of the liver is most frequently owing to the same causes, that produce the diabætes and dropsies ; namely, the great use of

F fermented



fermented liquors ; there is no wonder they should exist together, without being the consequence of each other.

5. If the cutaneous branch of absorbents gains a habit of being excited into stronger action, and imbibes greater quantities of moisture from the atmosphere, at the same time that the urinary branch has its motions inverted, another kind of diabætes is formed, which may be termed the *aqueous diabætes*. In this diabætes, the cutaneous absorbents frequently imbibe an amazing quantity of atmospheric moisture ; infomuch, that there are authentic histories, where many gallons a day, for many weeks together, above the quantity that has been drank, have been discharged by urine.

Dr. *Keil*, in his *Medicina Statica*, found that he gained eighteen ounces from the moist air of one night ; and Dr. *Percival* affirms, that one of his hands imbibed, after being well chafed, near an ounce and half of water, in a quarter of an hour. (Transact. of the College *London*, vol. ii, p. 102). *Home's* Medic. Facts, p. 2, sect. 3.



THE pale urine, in hysterical women, or which is produced by fear or anxiety, is a temporary complaint of this kind ; and would in reality be the same disease, if it was confirmed by habit.

6. THE purging stools, occasioned by exposing the naked body to cold air, or sprinkling it with cold water, originate from a similar cause ; for the mouths of the cutaneous lymphatics, being suddenly exposed to cold, become torpid ; and cease, or nearly cease, to act : whilst, by the sympathy above described, the intestinal lymphatics invert their motions, and immediately, what was previously absorbed, is returned into the intestines. At the very instant, that the body is exposed naked to the cold air, an unusual movement is felt in the bowels ; as is experienced by boys going into the cold bath ; this could not occur from an obstruction of the perspirable matter, since there is not time for that to be returned to the bowels by the course of the circulation.

THERE is also a chronic *aqueous diarrhæa*, in which the atmospheric moisture, drank up by the cutaneous and pulmonary lymphatics,



is poured into the intestines, by the retrograde motions of the lacteals. This disease is most similar to the aqueous diabætes, and is frequently exchanged for it: a distinct instance of this is recorded by *Benningerus*, cent. v. obs. 98, in which an aqueous diarrhæa succeeded an aqueous diabætes. and destroyed the patient. There is a curious example of this, described by *Sympton* (de re medica)--“ A young man (says he) was seized with a fever, upon which a diarrhæa came on, with great stupor; and he refused to drink any thing, though he was parched up with excessive heat: the better to supply him with moisture, I directed his feet to be immersed in cold water; immediately I observed a wonderful decrease of water in the vessel, and then an impetuous stream of a fluid, scarcely coloured, was discharged by stool, like a cataract.”

7. THERE is another kind of diarrhæa, which has been called cæliaca; in this disease the chyle, drank up by the lacteals of the small intestines, is poured into the large intestines, by the retrograde motions of their lacteals: as in the chyliferous diabætes, the chyle is poured into the bladder, by the retrograde



trograde motions of the urinary branch of absorbents.

THE chyliferous diabætes, like this chyliferous diarrhæa, produces sudden atrophy; since the nourishment, which ought to supply the hourly waste of the body, is expelled by the bladder, or rectum: whilst the aqueous diabætes, and the aqueous diarrhæa produce excessive thirst; because the moisture, which is obtained from the atmosphere, is not conveyed to the thoracic receptacle, as it ought to be, but to the bladder, or lower intestines; whence the chyle, blood, and whole system of glands, are robbed of their proportion of humidity.

8. THERE is a third species of diabaetes, in which the urine is mucaginous, and appears ropy in pouring it from one vessel into another; and will sometimes coagulate over the fire. This disease appears by intervals, and ceases again, and seems to be occasioned by a previous dropsy in some part of the body. When such a collection is re-absorbed, it is not always returned into the circulation; but the same irritation, that stimulates one lymphatic branch to re-absorb the deposited



deposited fluid, inverts the urinary branch, and pours it into the bladder. Hence this *mucaginous diabaetes* is a cure, or the consequence of a cure, of a worse disease, rather than a disease itself.

DR. *Cotunnius* gave half an ounce of cream of tartar, every morning, to a patient, who had the anasarca; and he voided a great quantity of urine; a part of which, put over the fire, coagulated, on the evaporation of half of it, so as to look like the white of an egg. De ischiade nervos.

THIS kind of diabaetes frequently precedes a dropfy; and has this remarkable circumstance attending it, that it generally happens in the night; as during the recumbent state of the body, the fluid, that was accumulated in the cellular membrane, or in the lungs, is more readily absorbed, as it is less impeded by its gravity. I have seen more than one instance of this disease. Mr. D. a man in the decline of life, who had long accustomed himself to spirituous liquor, had swelled legs, and other symptoms of approaching anasarca; about once in a week, or ten days, for several months, he was seized, on going to bed, with great general uneasiness, which  
his



his attendants resembled to an hysteric fit; and which terminated in a great discharge of viscid urine; his legs became less swelled, and he continued in better health for some days afterwards. I had not the opportunity to try if this urine would coagulate over the fire, when part of it was evaporated, which I imagine would be the criterion of this kind of diabætes; as the mucaginous fluid deposited in the cells and cysts of the body, which have no communication with the external air, seems to acquire, by stagnation, this property of coagulation by heat, which the secreted mucus of the intestines and bladder do not appear to possess; as I have found by experiment: and if any one should suppose this coagulable urine was separated from the blood by the kidneys, he may recollect, that in the most inflammatory diseases, in which the blood is most replete, or most ready to part with the coagulable lymph, none of this appears in the urine.

9. DIFFERENT kinds of diabaetes, require different methods of cure. For the first kind, or *chyliferous diabætes*, after clearing the stomach and intestines, by ipecacuhana and rhubarb, to evacuate any acid material,  
which



which may too powerfully stimulate the mouths of the lacteals, repeated and large doses of tincture of cantharides have been much recommended. The specific stimulus of this medicine, on the neck of the bladder, is likely to excite the numerous absorbent vessels, which are spread on that part, into stronger natural actions, and by that means prevent their retrograde ones; till, by persisting in the use of the medicine, their natural habits of motions might again be established. Another indication of cure, requires such medicines, as by lining the intestines with mucilaginous substances, or with such as consist of smooth particles, or which chemically destroy the acrimony of their contents, may prevent the too great action of the intestinal absorbents. For this purpose, I have found the earth precipitated from a solution of alum, by means of fixed alkali, given in the dose of half a dram every six hours, of great advantage, with a few grains of rhubarb, so as to procure a daily evacuation.

THE food should consist of materials that have the least stimulus, with emulsions, and calcarious water, as of Bristol and Matlock; that the mouths of the lacteals may be as  
little



little stimulated as is necessary for their proper absorption; least with their greater exertions, should be connected by sympathy, the inverted motions of the urinary lymphatics.

THE same method may be employed with equal advantage in the aqueous diabetes, so great is the sympathy between the skin and the stomach, as Dr. *Cullen* has so well illustrated, *Institut. of Medicine*, No. 203.—To which, however, some application to the skin might be usefully added; as rubbing the patient all over with oil, to prevent the too great action of the cutaneous absorbents. I knew an experiment of this kind made upon one patient with apparent advantage.

THE mucaginous diabetes will require the same treatment, which is most efficacious in the dropsey, and will be described below. I must add, that the diet and medicines above-mentioned, are strongly recommended by various authors, as by *Morgan*, *Willis*, *Harris*, and *Etmuller*; but more histories of the successful treatment of these diseases are wanting to fully ascertain the most efficacious methods of cure\*.

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\* IN a letter from Mr. CHARLES DARWIN, dated April 24, 1778, *Edinburgh*, is the subsequent passage :—  
 “ A man who had long laboured under a diabætes died yesterday, in the clinical ward. He had for some time drank four, and passed twelve pounds of fluid daily ; each pound of urine contained an ounce of sugar. He took, without considerable relief, gum kino, sanguis draconis melted with alum, tincture of cantharides, isinglass, gum arabic, crabs eyes, spirit of hartshorn, and eat ten or fifteen oysters thrice a day.

Dr. Home, having read my thesis, bled him, and found that *neither the fresh blood nor the serum tasted sweet.*

HIS body was opened this morning—every viscus appeared in a sound and natural state, except that the left kidney had a *very small pelvis*, and that there was a *considerable enlargement of most of the mesenteric lymphatic glands*. I intend to insert this in my thesis, as it coincides with the experiment, where some asparagus was eaten at the beginning of intoxication, and its smell perceived in the urine, though not in the blood.”

MR. Hughs, to whose unremitted care the infirmary at *Stafford* is much indebted, in a letter dated *October 10, 1778*, acquainted the editor of these sheets, “ that from two quarts of urine of a diabætic patient, in that infirmary, he had obtained four ounces and a half of a hard and brittle saccharine mass, like treacle, which had been sometime boiled :—And that four ounces of blood, which he had taken from the patient’s arm, with design to examine it, had the common appearance ; except that  
 the



the serum resembled cheese-whey ; and that, on the evidence of four persons, two of whom did not know what it was they tasted, the *serum had a saltish taste.*"

FROM both these cases it appears that the saccharine matter, with which the urine in diabætic patients so much abounds, never enters the blood-vessels ; like the nitre and asparagus, which was taken during the drunken diabætes, mentioned above, *sect. 3.*

CHAP.

## V. The



*V. The Phænomena of Dropsies explained.*

SOME inebriates have their paroxysms of inebriety terminated by much pale urine, or profuse sweats, or vomiting, or stools; others have their paroxysms terminated by stupor, or sleep, without the above evacuations.

THE former kind of these inebriates have been observed to be more liable to diabætes, and dropsy; and the latter to gout, gravel, and leprosy; as I have been well informed by a physician of extensive practice and careful observation. *Evæe!* attend ye bacchanalians! start at this dark train of evils, and amid your immodest jests, and ideot laughter recollect,

*Quem Deus vult perdere, prius dementat.*

IN those who are subject to diabætes and dropsy, the absorbent vessels are naturally more irritable than in the latter; and by being frequently disturbed or inverted by violent stimulus, and by their too great sympathy



pathy with each other, they become at length either entirely paralytic, or are only susceptible of motion from the stimulus of very acrid materials; as every part of the body, after having been used to great irritations, becomes less affected by smaller ones. Thus we cannot distinguish objects in the night, for some time after we come out of a strong light, though the iris is presently dilated; and the air of a summer evening appears cold, after we have been exposed to the heat of the day.

THERE are no cells in the body, where dropsy may not be produced, if the lymphatics cease to absorb that mucaginous fluid, which is perpetually deposited in them, for the purpose of lubricating their surfaces.

IF the lymphatic branch, which opens into the cellular membrane, either does its office imperfectly, or not at all; these cells become replete with a mucaginous fluid, which, after it has stagnated some time in the cells, will coagulate over the fire; and is erroneously called water. Wherever the seat of this disease is (unless in the lungs or other pendent viscera) the mucaginous liquid above-mentioned, will subside to the  
most



most depending parts of the body, as the feet and legs, when those are lower than the head and trunk; for all these cells have communications with each other.

WHEN the cellular absorbents are become insensible to their usual irritations, it most frequently happens, but not always, that the cutaneous branch of absorbents, which is strictly associated with them, suffers the like inability. And then, as no water is absorbed from the atmosphere, the urine is not only less diluted at the time of its secretion, and consequently in less quantity, and higher coloured: but great thirst is at the same time induced, for as no water is absorbed from the atmosphere to dilute the chyle and blood, the lacteals and other absorbent vessels, which have not lost their powers, are excited into more constant or more violent action, to supply this deficiency; whence the urine becomes still less in quantity, and of a deeper colour, and turbid like the yolk of an egg, owing to a greater absorption of its thinner parts. From this stronger action of those absorbents, which still retain their irritability, the fat is also absorbed, and the whole body becomes emaciated. This in-  
creased



creased exertion of some branches of the lymphatics, while others are totally or partially paralytic, is resembled by what constantly occurs in the hæmiplagia; when the patient has lost the use of the limbs on one side, he is incessantly moving those of the other; for the moving power, not having access to the paralytic limbs, becomes redundant in those which are not diseased.

THE paucity of urine and thirst cannot be explained from a greater quantity of mucaginous fluid being deposited in the cellular membrane; for though these symptoms have continued many weeks, or even months, this collection frequently does not amount to more than very few pints. Hence also the difficulty of promoting copious sweats in anasarca is accounted for, as well as the great thirst, paucity of urine, and loss of fat; since, when the cutaneous branch of absorbents is paralytic, or nearly so, there is already too small a quantity of aqueous fluid in the blood: nor can these torpid cutaneous lymphatics be readily excited into retrograde motions,

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HENCE likewise we understand, why in the ascites, and some other dropfies, there is often no thirst, and no paucity of urine; in these cases the cutaneous absorbents continue to do their office.

SOME have believed, that dropfies were occasioned by the inability of the kidneys, from having only observed the paucity of urine; and have thence laboured much to obtain diuretic medicines; but it is daily observable, that those who die of a total inability to make water, do not become dropfical in consequence of it: *Fernelius* mentions one, who laboured under a perfect suppression of urine, during twenty days before his death, and yet had not symptoms of dropfy. *Pathol. l. vi, c. 8.* From the same idea many physicians have restrained their patients from drinking, though their thirst has been very urgent; and some cases have been published, where this cruel regimen has been thought advantageous: but others of nicer observation are of opinion, that it has always aggravated the distresses of the patient; and though it has abated his swellings, yet by inducing a fever it has hastened his



his dissolution. See transactions of the College, *London*, vol. ii, page 235, cases of dropfy by Dr. G. Baker.

THE cure of anasarca, so far as respects the evacuation of the accumulated fluid, coincides with the idea of the retrograde action of the lymphatic system. It is well known, that vomits, and other drugs, which induce sickness or nausea, at the same time that they evacuate the stomach, produce a great absorption of the lymph accumulated in the cellular membrane. In the operation of a vomit, not only the motions of the stomach and duodenum become inverted, but also those of the lymphatics and lacteals, which belong to them; whence a great quantity of chyle and lymph is perpetually poured into the stomach and intestines, during the operation, and evacuated by the mouth. Now at the same time, other branches of the lymphatic system, viz. those which open on the cellular membrane, are brought into more energetic action, by the sympathy above-mentioned, and an increase of their absorption is produced.

HENCE repeated vomits, and cupreous salts, and small doses of squill, or foxglove,

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are so efficacious in this disease. And as drastic purges act also by inverting the motions of the lacteals; and thence the other branches of lymphatics are induced into more powerful natural action, by sympathy, and drink up the fluids from all the cells of the body; and by their anastomoses, pour them into the lacteal branches; which, by their inverted actions, return them into the intestines; and they are thus evacuated from the body:—these purges also are used with success in discharging the accumulated fluid in anasarca.



*VI. of*



## VI. Of cold Sweats.

THERE have been histories given of chronical immoderate sweatings, which bear some analogy to the diabætes. Dr. *Willis* mentions a lady then living, whose sweats were for many years so profuse, that all her bed-clothes were not only moistened, but deluged with them every night: and, that many ounces, and sometimes pints, of this sweat, were received in vessels properly placed, as it trickled down her body. He adds, that she had great thirst, had taken many medicines, and submitted to various rules of life, and changes of climate, but still continued to have these immoderate sweats. Pharmac. ration. de sudore anglico.

Dr. *Willis* has also observed, that the sudor anglicanus which appeared in *England*, in 1483, and continued 'till 1551, was in some respects similar to the diabætes; and as Dr. *Caius*, who saw this disease, mentioned the visciditv, as well as the quantity of these sweats, and adds, that the extremities were often cold, when the internal parts were burnt up with heat and thirst, with great



and speedy emaciation and debility : there is great reason to believe, that the fluids were absorbed from the cells of the body by the cellular and cystic branches of the lymphatics, and poured on the skin by the retrograde motions of the cutaneous ones.

THE infallible *Sydenham* has recorded, in the stationary fever of the year 1685, the viscid sweats flowing from the head, which were probably from the same source as those in the sweating plague above-mentioned.

It is very common in dropfies of the chest or lungs, to have the difficulty of breathing relieved by copious sweats, flowing from the head and neck. Mr. P. about 50 years of age, had for many weeks been afflicted with anasarca of his legs and thighs, attended with difficulty of breathing : and had repeatedly been relieved by squill, other bitters, and chalybeates—One night the difficulty of breathing became so great, that it was thought he must have expired ; but so copious a sweat came out of his head and neck, that in a few hours some pints, by estimation, were wiped off from those parts, and his breath was for a time relieved. This dyspnœa and these sweats recurred at intervals,



vals, and after some weeks he ceased to exist. The skin of his head and neck felt cold to the hand, and appeared pale at the time these sweats flowed so abundantly; which is a proof, that they were produced by an inverted motion of the absorbents of those parts: for sweats, which are the consequence of an increased action of the sanguiferous system, are always attended with a warmth of the skin, greater than is natural, and a more florid colour; as the sweats from exercise, or those that succeed the cold fits of agues. Can any one explain how these partial sweats should relieve the difficulty of breathing in anasarca, but by supposing that the pulmonary branch of absorbents drank up the fluid in the cavity of the thorax, or in the cells of the lungs, and threw it on the skin, by the retrograde motions of the cutaneous branch? for, if we could suppose that the increased action of the cutaneous glands or capillaries, poured upon the skin, this fluid, previously absorbed from the lungs; why is not the whole surface of the body covered with sweat? why is not the skin warm? Add to this, that the sweats above-mentioned were clammy or glutinous, which the condensed perspirable matter is not;



not; whence it would seem to have been a different fluid from that of common perspiration.

DR. *Dobson*, of *Liverpool*, has given a very ingenious explanation of the acid sweats, which he observed in a diabætic patient—he thinks part of the chyle is secreted by the skin, and afterwards undergoes an acetous fermentation:—Can the chyle get thither, but by an inverted motion of the cutaneous lymphatics? in the same manner as it is carried to the bladder, by the inverted motions of the urinary lymphatics. *Medic observat. and enq. London*, vol. v.

ARE not the cold sweats in some fainting fits, and in dying people, owing to an inverted motion of the cutaneous lymphatics? for in these there can be no increased arterial or glandular action,

Is the difficulty of breathing, arising from anasarca of the lungs, relieved by sweats from the head and neck, whilst that difficulty of breathing, which arises from a dropsey of the thorax, or pericardium, is never attended with these sweats of the head? and thence can these diseases be distinguished from



from each other? do the periodic returns of nocturnal asthma arise from a temporary dropy of the lungs, collected during their more torpid state in sound sleep, and then re-absorbed by the vehement efforts of the disordered organs of respiration, and carried off by the copious sweats about the head and neck?

MORE extensive and accurate dissections of the lymphatic system are wanting to enable us to unravel these knots of science.



## VII. Transla-



*VII. Translations of Matter, of Chyle, of Milk, of Urine. Operation of purging Drugs applied externally.*

1. **T**HE translations of matter from one part of the body to another, can only receive an explanation from the doctrine of the occasional retrograde motions of some branches of the lymphatic system : for how can matter, absorbed and mixed with the whole mass of blood, be so hastily collected again in any one part ? and is it not an immutable law, in animal bodies, that each gland can secrete no other, but its own proper fluid ? which is, in part, fabricated in the very gland from an animal process, which it there undergoes : of these purulent translations innumerable and very remarkable instances are recorded.

2. **T**HE chyle, which is seen among the materials thrown up by violent vomiting, or in purging stools, can only come thither by its having been poured into the bowels by the inverted motions of the lacteals : for our aliment



aliment is not converted into chyle in the stomach or intestines by a chemical process, but is made in the very mouths of the lacteals; or in the mesenteric glands; in the same manner as other secreted fluids are made by an animal process in their adapted glands.

HERE a curious phenomenon in the exhibition of mercury is worth explaining:—If a moderate dose of calomel, as six or ten grains, be swallowed, and within one or two days a cathartic is given, a salivation is prevented: but after three or four days, a salivation having come on, repeated purges every day, for a week or two, are required to eliminate the mercury from the constitution. For this acrid metallic preparation, being absorbed by the mouths of the lacteals, continues, for a time, arrested by the mesenteric glands, (as the variolus or venereal poisons swell the subaxillar or inguinal glands): which, during the operation of a cathartic, is returned into the intestines by the inverted action of the lacteals, and thus carried out of the system.

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HENCE we understand the use of vomits or purges, to those who have swallowed either contagious or poisonous materials, even though exhibited a day or even two days after such accidents; namely, that by the retrograde motions of the lacteals and lymphatics, the material still arrested in the mesenteric, or other glands, may be eliminated from the body.

3. MANY instances of milk and chyle found in ulcers, are given by *Haller*, *El. Physiol.* t. vii, p. 12, 23, which admit of no other explanation than by supposing, that the chyle, imbibed by one branch of the absorbent system, was carried to the ulcer, by the inverted motions of another branch of the same system.

4. MRS. P. on the second day after delivery, was seized with a violent purging, in which, though opiates, mucilages, the bark, and testacea were profusely used, continued many days, till at length she recovered. During the time of this purging, no milk could be drawn from her breasts; but the stools appeared like the curd of milk broken into small pieces. In this case, was not the  
milk



milk taken up from the follicles of the pectoral glands, and thrown on the intestines, by a retrogression of the intestinal absorbents? for how can we for a moment suspect that the mucus glands of the intestines could separate pure milk from the blood? Doctor *Smelly* has observed, that loose stools, mixed with milk, which is curdled in the intestines, frequently relieves the turgescency of the breasts of those, who studiously repel their milk. Cases in Midwifery, 43, No. 2. 1.

5. *J. F. Meckel* observed in a patient, whose urine was in small quantity and high coloured, that a copious sweat under the arm-pits, of a perfectly urinous smell, stained the the linen; which ceased again when the usual quantity of urine was discharged by the urethra. Here we must believe from analogy, that the urine was first secreted in the kidneys, then re-absorbed by the increased action of the urinary lymphatics, and lastly carried to the axillæ by the retrograde motions of the lymphatic branches of those parts. As in the jaundice it is necessary, that the bile should first be secreted by the liver, and re-absorbed into the circulation, to produce the yellowness of the skin; as was formerly



demonstrated by the late Dr, *Monro*, (*Edin. Medical Essays*) and if in this patient the urine had been reſorbed into the maſs of blood, as the bile in the jaundice, why was it not detected in other parts of the body, as well as in the arm-pits ?

6. CATHARTIC and vermifuge medicines applied externally to the abdomen, ſeem to be taken up by the cutaneous branch of lymphatics, and poured on the inteſtines by the retrograde motions of the lacteals, without having paſſed the circulation.

For when the draſtic purges are taken by the mouth, they excite the lacteals of the inteſtines into retrograde motions, as appears from the chyle, which is found coagulated amongſt the ſæces, as was ſhewn above, (ſect 2 and 4). And as the cutaneous lymphatics are joined with the lacteals of the inteſtines, by frequent anastoſes ; it would be more extraordinary, when a ſtrong purging drug, abſorbed by the ſkin, is carried to the anastoſing branches of the lacteals unchanged, if it ſhould not excite them into retrograde action as efficaciously, as if it was taken by the mouth, and mixed with the food in the ſtomach.



*VIII. Circumstances by which the fluids, that are effused by the retrograde Motions of the absorbent Vessels, are distinguished.*

1. **W**E frequently observe an unusual quantity of mucus, or other fluids, in some diseases, although the action of the glands, by which those fluids are separated from the blood, is not unusually increased; but when the power of absorption alone is diminished. Thus the catarrhal humour, from the nostrils of some, who ride in frosty weather; and the tears, which run down the cheeks of those, who have an obstruction of the puncta lacrymalia; and the ichor of those phagedenic ulcers, which are not attended with inflammation, are all instances of this circumstance.

THESE fluids however are easily distinguished from others, by their abounding in ammoniacal or muriatic salts; whence they inflame the circumjacent skin: thus in the catarrh, the upper lip becomes red and swelled,



led, from the acrimony of the mucus, and patients complain of the saltness of its taste. The eyes and cheeks are red with the corrosive tears, and the ichor of some herpetic eruptions erodes far and wide the contiguous parts, and is pungently salt to the taste, as some patients have informed me.

WHILST, on the contrary, those fluids, which are effused by the retrograde action of the lymphatics, are for the most part mild and innocent; as water, chyle, and the natural mucus: or they take their properties from the materials previously absorbed, as in the coloured or vinous urine, or that scented with asparagus, described before.

2. WHENEVER the secretion of any fluid is increased, there is at the same time an increased heat in the part; for the secreted fluid, as the bile, did not previously exist in the mass of blood, but a new combination is produced in the gland. Now as solutions are attended with cold, so combinations are attended with heat; and it is probable the sum of the heat given out by all the secreted fluids of animal bodies may be the cause of their general heat above that of the atmosphere.

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HENCE the fluids derived from increased secretions are readily distinguished from those originating from the retrograde motions of the lymphatics: thus an increase of heat either in the diseased parts, or diffused over the whole body, is perceptible, when copious bilious stools are consequent to an inflamed liver; or a copious mucous salivation from the inflammatory angina.

3. WHEN any secreted fluid is produced, in an unusual quantity, and at the same time the power of absorption is increased in equal proportion, not only the heat of the gland becomes more intense, but the secreted fluid becomes thicker and milder, its thinner and saline parts being re-absorbed: and these are distinguishable both by their greater consistence, and by their heat, from the fluids, which are effused by the retrograde motions of the lymphatics; as is observable, towards the termination of gonorrhæa, catarrh, chincough, and in those ulcers, which are said to abound with laudable pus.

4. WHEN chyle is observed in stools, or among the materials ejected by vomit, we  
may



may be confident it must have been brought thither by the retrograde motions of the lacteals; for chyle does not previously exist amid the contents of the intestines, but is made in the very mouths of the lacteals, as was before explained.

5. WHEN chyle, milk, or other extraneous fluids are found in the urinary bladder, or in any other excretory receptacle of a gland; no one can for a moment believe these have been collected from the mass of blood by a morbid secretion, as it contradicts all analogy.

——— *Aurea duræ*

*Mala ferant quercus? Narcisco floreat alnus?*

*Pinguia corticibus sudent electra myricæ?*

VIRGIL.

*I X. Synopsis*



*I X. Synopsis of Diseases, which originate from the retrograde Motions of the absorbent Vessels.*

I. RETROGRADE MOTIONS OF THE ALIMENTARY CANAL.

1. *RUMINATION*. In the rumination of horned cattle, the retrograde Motions of the œsophagus are visible to the eye; and there are histories of ruminating men, and who have taken pleasure in the act of this second mastication of their food. (Phil. transactions).

2. *Ructus*. An inverted motion of the stomach, excluding through its upper valve an elastic vapour, which is generated by the fermentation of the aliment, when the digestion does not soon enough subdue it.

3. *Pyrosis*. Water-qualm—a few mouthfuls of the aliment are rejected at a time, for some hours after meals, by the inverted motions of the stomach and œsophagus.

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When this aliment is become very acid, it produces cardialgia.

4. *Vomitus.* A violent inverted motion of the stomach and œsophagus, with their absorbent vessels, by which their contents are evacuated.

5. *Ileus.* A violent inverted motion of the whole intestinal canal, from the mouth to the anus; and of the lacteals, or absorbents which arise from it. In this pittyable disease, through the valve of the colon, through the pylorus, the cardia, the pharinx, are ejected first the contents of the stomach and intestines, with the excrement and even clysters themselves; then the fluid from the lacteals, which is now poured into the intestines, by their retrograde motions, is thrown up by the mouth; and lastly, every fluid, which is absorbed by the other lymphatic branches, from the cellular membrane, the skin, the bladder, and all other cavities of the body; and which is then poured into the stomach or intestines, by the retrograde motions of the lacteals: all which supply that amazing quantity of fluid, which is in this disease continually ejected by vomiting.



6. *Globus hystericus*. An ineffectual retrograde motion of the œsophagus, nothing being rejected from the stomach.

7. *Vomendi conamen hystericum*. An ineffectual retrograde motion of the stomach: it frequently occurs when the stomach is empty, and often continues many hours; and as the lymphatics of the stomach are not inverted at the same time, there is no supply of materials to be ejected.

8. *Borborismus*. A partial inversion of the peristaltic motion of the bowels, by which the gas is brought into a superior part of the bowel, and bubbles through the descending fluid.

9. *Hysteria*. The three last articles, together with the aqueous diabætes, are the most common symptoms of the hysteric disease: to which sometimes is added the salivatio lymphatica, and syncope, or convulsion, with palpitation of the heart, and great fear of dying: which last circumstance distinguishes these convulsions from the epileptic ones, with greater certainty than any other single symptom.



THE pale copious urine, cold skin, pal-  
pitation of heart, and trembling, are the  
symptoms usually excited by great fear:—  
hence, in hysterical diseases, when these symp-  
toms occur, the fear, which has been for-  
merly associated with them, recurs at the  
same time.

10. *Hydrophobia*. A violent inversion of  
the motions of the œsophagus on the ap-  
proach of water, or other fluids. The pha-  
rynix, in this disease, seems to have acquired  
the sensibility of the larynx, and is equally  
impatient to reject any fluid, which gets into  
it—Is the cardia ventriculi the seat of this  
disease?

## II. RETRO-



## II. RETROGRADE MOTIONS OF THE ABSORBENT SYSTEM.

1. *CATARRHUS lymphaticus.* A periodical defluxion of a thin fluid from the nostrils, for a few hours, occasioned by the retrograde motions of their lymphatics. It is distinguished from that mucous discharge which happens in frosty weather from decreased absorption, because it is less salt to the taste; and from an increased secretion of mucous, because it is neither so viscid, nor is attended with heat of the part.

2. *Salivatio lymphatica.* A copious ex-puition of a pellucid insipid fluid, occasioned by the retrograde motions of the lymphatics of the mouth. It is sometimes periodical, and often attends the hysteric disease, and nervous fevers, but is not accompanied with heat of the mouth or nausea.

3. *Nausea.* A discharge of fluid from the retrograde motions of the lymphatics about the fauces, together with some retrograde motions of the fauces and pharinx.

4. *Diarrhæa*



4. *Diarrhæa lymphatica.* A quantity of mucus and lymph are poured into the intestines by the inverted motions of the intestinal lymphatics. The feces are less fetid and more liquid ; and it sometimes portends the commencement or the termination of a diabætes.

5. *Diarrhæa chyliifera, seu cæliaca.* The chyle, drank up by the lacteals of the smaller intestines, is poured into the larger ones, by the retrograde motions of their lacteals. It differs from the lymphatic diarrhæa, as the chyliiferous diabætes differs from the aqueous and mucaginous diabætes.

6. *Diabætes.* By the retrograde motions of the urinary lymphatics, an immense quantity of fluid is poured into the bladder. It is either termed chyliiferous, or aqueous, or mucaginous, from the nature of the fluid brought into the bladder ; and is either a temporary disease, as in hysteric women, in the beginning of intoxication, in worm cases, or in those exposed to cold damp air, or to great fear or anxiety, or in the commencement of some dropfies ; or it becomes chronical.

WHEN



WHEN the urinary lymphatics invert their motions, and pour their reflux contents into the bladder, some other branch of the absorbent system acts with greater energy to supply this fluid. If it is the intestinal branch, the chyliferous diabætes is produced: if it is the cutaneous branch, the aqueous diabætes is produced: and if the cellular, or cystic branches, the mucaginous diabætes.

7. *Sudor lymphaticus.* Profuse sweats, from the inverted motions of the cutaneous lymphatics, as at the approach of death; and as perhaps in the *fudor anglicanus*. These sweats are glutinous to the touch, and without increased heat of the skin: if the part is uncovered the skin becomes cold from the evaporation of the fluid.

8. *Sudor asthmaticus.* The cold sweats in this disease only cover the head, arms, and breast, and are frequently exceedingly profuse. These sweats are owing to the inverted motions of the cutaneous lymphatics, of the upper part of the body, and at the same time the increased absorption of the pulmonary absorbents: hence, these  
sweats,



sweats, when violent, relieve the present fit of asthma. In the convulsive asthma these sweats do not occur : hence they may be distinguished. May one be called the anarcous asthma, and the other the epileptic asthma ?



### III. RETRO-



### III. RETROGRADE MOTIONS OF THE ARTERIAL SYSTEM.

1. *Capillarium motus retrogradus.* In microscopic experiments it is usual to see globules of blood regurgitate from the capillary vessels again and again, before they pass through them.

2. *Palpitatio cordis?* Ineffectual and weak retrograde motions of the heart? in hysteric cases? and from fear?



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IV. RETRO-



#### IV. RETROGRADE MOTIONS OF VEGETABLE JUICES.

THE motions of the sap in vegetables bear some analogy to our present subject; and as the vegetable tribes are by many philosophers held to be inferior animals, it may be a matter of curiosity at least to observe, that their absorbent vessels seem evidently, at times, to be capable of a retrograde motion. Mr. *Perault* cut off a forked branch of a tree, with the leaves on; and inverting one of the forks into a vessel of water, observed, that the leaves on the other branch continued green much longer than those of a similar branch, cut off from the same tree; which shews, that the water from the vessel was carried up one part of the forked branch, by the retrograde motion of its vessels, and supplied nutriment sometime to the other part of the branch, which was out of the water. And the celebrated Dr. *Hales* found, by numerous very accurate experiments, that the sap of trees rose upwards during the warmer hours of the day, and in part descended again during the cooler ones. Vegetable Statics.

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IT is well known that the branches of willows, and of many other trees, will either take root in the earth, or engraft on other trees, so as to have their natural direction inverted, and yet flourish with vigour.

DR. *Hope* has also made this pleasing experiment, after the manner of *Hales*—he has placed a forked branch, cut from one tree, erect between two others; then cutting off a part of the bark from one fork apply'd it to a similar branch of one of the trees in its vicinity; and the same of the other fork; so that a tree is seen to grow suspended in the air, between two other trees; which supply their foster friend with due nourishment.

*Miranturque novas frondes, et non sua poma.*

ALL these experiments clearly evince, that the juices of vegetables can occasionally pass either upwards or downwards in their absorbent system of vessels.

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X. Ob-



*X. Objections answered.*

THE following experiment, at first view, would seem to invalidate this opinion of the retrograde motions of the lymphatic vessels, in some diseases.

ABOUT a gallon of milk having been given to an hungry swine, he was suffered to live about an hour, and was then killed by a stroke or two on his head, with an axe.—On opening his belly the lacteals were well seen filled with chyle; on irritating many of the branches of them with a knife, they did not appear to empty themselves hastily; but they did, however, carry forwards their contents in a little time.

I THEN passed a ligature round several branches of lacteals, and irritated them much with a knife beneath the ligature, but could not make them regurgitate their contained fluid into the bowels.

I AM not indeed certain, that the nerve was not at the same time included in the ligature,



gature, and thus the lymphatic rendered un-irritable or lifeless ; but this, however, is certain, that it is not any quantity of any stimulus, which induces the vessels of animal bodies to revert their motions ; but a certain quantity of a certain stimulus, as appears from wounds in the stomach, which do not produce vomiting ; and wounds of the intestines, which do not produce the cholera morbus.

AT *Nottingham*, a few years ago, two shoemakers quarrelled, and one of them with a knife, which they use in their occupation, stabbed his companion about the region of the stomach. On opening the abdomen of the wounded man, after his death, the food and medicines he had taken were, in part, found in the cavity of the belly, on the outside of the bowels ; and there was a wound about half an inch long, at the bottom of the stomach ; which I suppose was distended with liquor and food, at the time of the accident ; and thence was more liable to be injured at its bottom : but during the whole time he lived, which was about ten days, he had no efforts to vomit, nor ever even complained of being sick at his stomach ! Other cases



cases fimilar to this are mentioned in the philosophical tranfactions.

THUS, if you vellicate the throat with a feather, naufea is produced; if you wound it with a penknife, pain is induced, but not ficknefs. So if the foles of the feet of children, or their armpits are tickled, convulfive laughter is excited, which ceafes the moment the hand is applied, fo as to rub them more forcibly.

THE experiment, therefore, above-related, upon the lacteals of a dead pig, which were included in a ftrict ligature, proves nothing; as it is not the quantity, but the kind of ftimulus, which excites the lymphatic veffels into retrograde motion.

*XI. The*



*XI. The Causes which induce the retrograde Motions of animal Vessels ; and the Medicines by which the natural Motions are restored.*

1. **S**UCH is the construction of animal bodies, that all their parts, which are subjected to less stimuli than nature designed, perform their functions with less accuracy : thus, when too watery, or too acescent food, is taken into the stomach, indigestion, and flatulency, and heartburn succeed.

2. **A**NOTHER law of irritation, connate with our existence, is, that all those parts of the body, which have previously been exposed to too great a quantity of such stimuli, as strongly affect them, become for some time afterwards disobedient to the natural quantity of their adapted stimuli.—Thus the eye is incapable of seeing objects in an obscure room, though the iris is quite dilated, after having been exposed to the meridian sun.

3. **T**HERE



3. THERE is a third law of irritation, that all the parts of our bodies, which have been lately subjected to less stimulus, than they have been accustomed to, when they are exposed to their usual quantity of stimulus, are excited into more energetic motions : thus when we come from a dusky cavern into the glare of daylight, our eyes are dazzled ; and after emerging from the cold bath, the skin becomes warm and red.

4. THERE is a fourth law of irritation, that all the parts of our bodies, which are subjected to still stronger stimuli for a length of time, become torpid, and refuse to obey even these stronger stimuli ; and thence do their offices very imperfectly—Thus, if any one looks earnestly for some minutes on an area, an inch diameter, of red silk, placed on a sheet of white paper, the image of the silk will gradually become pale, and at length totally vanish, as Mr. *Buffon* observes ; and I have myself frequently experienced. Mem. de l'acad. roy.

5. NOR is it the nerves of sense alone, as the optic and auditory nerves, that thus become torpid, when the stimulus is withdrawn,

or



or their irritability decreased ; but the motive muscles, when they are deprived of their natural stimuli, or of their irritability, become torpid and paralytic ; as is seen in the tremulous hand of the drunkard, in a morning ; and in the awkward step of age.

THE hollow muscles also, of which the various vessels of the body are constructed, when they are deprived of their natural stimuli, or of their due degree of irritability, not only become tremulous, as the arterial pulsations of dying people ; but also frequently invert their motions, as in vomiting, in hysteric suffocations, and diabætes above-described.

I MUST beg your patient attention, for a few moments, whilst I endeavour to explain, how the retrograde actions of our hollow muscles are the consequence of *their* debility ; as the tremulous actions of the solid muscles are the consequence of *their* debility. When, through fatigue, a muscle can act no longer ; the antagonist muscles, either by their inanimate elasticity, or by their animal action, draw the limb into a contrary direction : in the solid muscles, as those of locomotion, their actions are *associated in*

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*tribes,*



*tribes*, which have been accustomed to synchronous action only ; hence when they are fatigued, only a single contrary effort takes place ; which is either tremulous, when the fatigued muscles are again immediately brought into action ; or it is a pandiculation, or stretching, where they are not immediately again brought into action.

Now the motions of the hollow muscles, as they in general propel a fluid along their cavities, are *associated in trains*, which have been accustomed to successive actions : hence when one ring of such a muscle is fatigued from its too great debility, and is brought into retrograde action, the next ring from its association falls *successively* into retrograde action ; and so on throughout the whole canal.

6. BUT as the retrograde motions of the stomach, œsophagus, and fauces in vomiting are, as it were, apparent to the eye ; we shall consider this operation more minutely, that the similar operations in the more recondite parts of our system may be easier understood.

FROM



FROM certain nauseous ideas of the mind, from an ungrateful taste in the mouth, or from fœtid smells, vomiting is sometimes instantly excited; or even from a stroke on the head, or from the vertiginous motions of a ship; all which originate from association, or sympathy; and which, least I should abuse your patience, I shall not now endeavour to explain.

BUT when the stomach is subjected to a less stimulus than is natural, according to the first law of irritation, mentioned above, its motions become disturbed, as in hunger; first pain is produced, then sickness, and at length vain efforts to vomit, as many authors inform us.

BUT when a great quantity of wine, or of opium, are swallowed, the retrograde motions of the stomach do not occur till after several minutes, or even hours: for when the power of so strong a stimulus ceases, according to the second law of irritation, mentioned above, the peristaltic motions become tremulous, and at length retrograde; as is well known to the drunkard, who on the next morning has sickness and vomitings.



WHEN a still greater quantity of wine, or of opium, or when nauseous vegetables, or strong bitters, or metallic salts, are taken into the stomach, they quickly induce vomiting; though all these, in less doses, excite the stomach into more energetic action, and strengthen the digestion; as the flowers of chamomile, and the vitriol of zine: for, according to the fourth law of irritation, the stomach will not long be obedient to a stimulus so much greater than is natural; but its action becomes first tremulous and then retrograde.

7. WHEN the motions of any vessels become retrograde, less heat of the body is produced; for in paroxysms of vomiting, of hysteric affections, of diabætes, of asthma, the extremities of the body are cold: hence we may conclude, that these symptoms arise from the debility of the parts in action; for an increase of muscular action is always attended with increase of heat.

8. BUT as animal debility is owing to defect of stimulus, or to defect of irritability, as shewn above, the method of cure is easily deduced: when the vascular muscles are not excited into their due action by the natural stimuli,



stimuli, we should exhibit those medicines, which possess a still greater degree of stimulus; amongst these are the fœtids, the volatiles, aromatics, bitters, metallic salts, opiates, wine, which indeed should be given in small doses, and frequently repeated. To these should be added constant, but moderate exercise, cheerfulness of mind, and change of country to a warmer climate; and perhaps, occasionally the external stimulus of blisters.

It is also frequently useful to diminish the quantity of natural stimulus, for a short time, by which afterwards the irritability of the system becomes increased; according to the third law of irritation above-mentioned, hence the use of baths somewhat colder than animal heat, and of equitation in the open air.

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THUS have I endeavoured, in a concise manner, to explain the numerous diseases, which deduce their origin from the inverted motions of the hollow muscles of our bodies: and it is probable the Saint Vitus's dance, and the stammering of speech, originate



nate from a similar inverted order of the associated motions of some of the solid muscles; which, as it is foreign to my present purpose, I shall not here discuss.

I BEG, illustrious professors, and ingenious fellow-students, that you will recollect how difficult a task I have attempted, to evince the retrograde motions of the lymphatic vessels, when the vessels themselves, for so many ages, escaped the eyes and glasses of philosophers: and if you are not quite convinced of the truth of this theory, hold, I entreat you, your minds in suspense, 'till ANATOMY draws her sword, with happier omens, cuts asunder the knots which entangle PHYSIOLOGY; and, like an augur, inspecting the immolated victim, announces to mankind the wisdom of HEAVEN.





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A NOTE belonging to  
Page 65, and 68.

THE foxglove has been given to drop-  
fical patients in this country with con-  
siderable success: the following cases are  
related with design to ascertain the particular  
kinds of dropsy, in which this drug is pre-  
ferable to squill, or other evacuants.

*Anasarca of the Lungs.*

1. A LADY, between forty and fifty  
years of age, had been indisposed sometime,  
was then seized with cough, and fever, and  
afterwards expectorated much digested mu-  
cus. This expectoration suddenly ceased,  
and a considerable difficulty of breathing su-  
pervened, with a pulse very irregular both in  
velocity and strength; she was much distressed  
at first lying down, and at first rising; but  
after



*after a minute or two bore either of those attitudes with ease.* She had no pain or numbness in her arms; she had no hectic fever, nor any cold shiverings, and *the urine was in due quantity, and of the natural colour.*

THE difficulty of breathing was twice considerably relieved by small doses of ipecacuhana, which operated upwards and downwards, but recurred in a few days: she was then directed a decoction of foxglove, (*digitalis purpurea*) prepared by boiling four ounces of the fresh leaves from two pints of water to one pint; to which was added two ounces of vinous spirit: she took three large spoonfuls of this mixture every two hours, till she had taken it four times; a continued sickness supervened, with frequent vomiting, and a copious flow of urine: these evacuations continued at intervals for two or three days, and relieved the difficulty of breathing—She had some relapses afterwards, which were again relieved by the repetition of the decoction of foxglove.

2. A GENTLEMAN, about sixty years of age, who had been addicted to an immoderate use of fermented liquors, and had been  
very



very corpulent, gradually lost his strength and flesh ; had great difficulty of breathing, with legs somewhat swelled, and a very irregular pulse. He was very much distressed at first lying down, and at first rising from his bed, yet *in a minute or two was easy in both those attitudes.* He made *straw-coloured urine in due quantity*, and had no pain or numbness of his arms.

HE took a large spoonful of the decoction of foxglove, as above, every hour for ten or twelve successive hours, had incessant sickness for about two days, and passed a large quantity of urine ; upon which his breath became quite easy, and the swelling of his legs subsided, but as his whole constitution was already sinking from the previous intemperance of his life, he did not survive more than three or four months.

### *Hydrops Pericardii.*

3. A GENTLEMAN of temperate life and sedulous application to business, between thirty and forty years of age, had long been subject, at intervals, to an irregular pulse : a

N

few



few months ago he became weak, with difficulty of breathing, and dry cough. In this situation a physician of eminence directed him to abstain from all animal food and fermented liquor, during which regimen all his complaints increased; he now became emaciated, and totally lost his appetite; his pulse very irregular both in velocity and strength; with great difficulty of breathing and some swelling of his legs; yet *he could lie down horizontally in his bed*, though he got little sleep, and passed *a due quantity of urine, and of the natural colour*; no fullness or hardness could be perceived about the region of the liver; and he had no pain or numbness in his arms.

ONE night he had a most profuse *sweat all over his body and limbs*, which quite deluged his bed, and for a day or two somewhat relieved his difficulty of breathing, and his pulse became less irregular: this copious sweat recurred three or four times at the intervals of five or six days, and repeatedly alleviated his symptoms.

HE was directed one large spoonful of the above decoction of foxglove every hour, till it procured some considerable evacuation:  
after



after he had taken it eleven successive hours he had a few liquid stools, attended with a great flow of urine, which last had a dark tinge, as if mixed with a few drops of blood: he continued sick at intervals for two days, but his breath became quite easy, and his pulse quite regular, the swelling of his legs disappeared, and his appetite and sleep returned.

HE then took three grains of white vitriol twice a day, with some bitter medicines, and a grain of opium with five grains of rhubarb every night; was advised to eat flesh meat, and spice, as his stomach would bear it, with small beer, and a few glasses of wine; and had issues made in his thighs; and has suffered no relapse.

4. A LADY, about fifty years of age, had for some weeks great difficulty of breathing, with very irregular pulse, and considerable general debility: *she could lie down in bed, and the urine was in due quantity and of the natural colour*, and she had no pain or numbness of her arms.

SHE took one large spoonful of the above decoction of foxglove every hour, for ten or twelve successive hours; was sick, and



made a quantity of pale urine for about two days, and was quite relieved both of the difficulty of breathing, and the irregularity of her pulse. She then took a grain of opium, and five grains of rhubarb, every night, for many weeks; with some slight chalybeate and bitter medicines, and has suffered no relapse.

### *Hydrops Thoracis.*

5. A TRADESMAN, about fifty years of age, became weak and short of breath, especially on increase of motion, with *pain in one arm*, about the insertion of the biceps muscle. He observed he sometimes in the night made an unusual quantity of pale water. He took calomel, alum, and peruvian bark, and all his symptoms increased: his legs began to swell considerably; his breath became more difficult, and he *could not lie down in bed*; but all this time he made a *due quantity of straw-coloured water*.

THE decoction of foxglove was given, as in the preceeding cases, which operated chiefly by purging, and seemed to relieve his breath for a day or two; but also seemed to contribute



tribute to weaken him—He became after some weeks universally dropfical, and died comatous.

6. A YOUNG lady of delicate constitution, with light eyes and hair, and who had perhaps lived too abstemiously both in respect to the quantity and quality of what she eat and drank, was seized with great difficulty of breathing, so as to threaten immediate death. Her extremities were quite cold, and her breath felt cold to the back of ones hand. She had no sweat, *nor could lie down for a single moment*; and had previously and at present complained of great weakness and *pain and numbness of both her arms*; had no swelling of her legs, no thirst, water in due quantity and colour. Her sister, about a year before, was afflicted with similar symptoms, was repeatedly blooded, and died universally dropfical.

A GRAIN of opium was given immediately and repeated every six hours with evident and amazing advantage; afterwards a blister, with chalybeates, bitters, and essential oils were exhibited, but nothing had such eminent effect in relieving the difficulty of breathing and coldness of her extremities



as opium, by the use of which in a few weeks she perfectly regained her health, and has for more than two years suffered no relapse.

*Ascites.*

7. A YOUNG lady of delicate constitution having been exposed to great fear, cold, and fatigue, by the overturn of a chaise in the night, began with pain and tumour in the right hypochondrium: in a few months a fluctuation was felt throughout the whole abdomen, more distinctly perceptible indeed about the region of the stomach; since the integuments of the lower part of the abdomen generally become thickened in this disease by a degree of anasarca. Her legs were not swelled, no thirst, water in due quantity and colour—She took the foxglove so as to induce sickness and stools, but without abating the swelling, and was obliged at length to submit to the operation of tapping.

8. A MAN about sixty-seven, who had long been accustomed to spirituous potation, had some time laboured under ascites; his legs somewhat swelled; his breath easy in all attitudes;



attitudes ; no appetite ; great thirst ; urine in exceedingly small quantity, very deep coloured, and turbid ; pulse equal. He took the foxglove in such quantity as vomited him, and induced sickness for two days ; but procured no flow of urine, or diminution of his swelling ; but was thought to leave him considerably weaker.

9. A CORPULENT man, accustomed to large potation of fermented liquors, had vehement cough, difficult breathing, anasarca of his legs, thighs, and hands, and considerable tumour, with evident fluctuation of his abdomen ; his pulse was equal, his urine in small quantity, of deep colour, and turbid. These swellings had been twice considerably abated by drastic cathartics. He took three ounces of a decoction of foxglove (made by boiling one ounce of the fresh leaves in a pint of water) every three hours, for two whole days ; it then began to vomit and purge him violently, and promoted a great flow of urine ; he was by these evacuations compleatly emptied in twelve hours. After two or three months all these symptoms returned, and were again relieved by the use of the foxglove ; and thus in the space of  
about



about three years he was about ten times evacuated, and continued all that time his usual potations : excepting at first, the medicine operated only by urine, and did not appear considerably to weaken him—The last time he took it, it had no effect ; and a few weeks afterwards he vomited a great quantity of blood and expired.

## Q U E R I E S.

1. As the first six of these patients had a due discharge of urine, and of the natural colour ; was not the seat of the disease confined to some part of the thorax ; and the swelling of the legs rather a symptom of the obstructed circulation of the blood, than of a paralysis of the cellular lymphatics of those parts ?

2. WHEN the original disease is a general anasarca, do not the cutaneous lymphatics always become paralytic at the same time with the cellular ones, by their greater sympathy with each other ? and hence the paucity of urine, and the great thirst distinguish this kind of dropsy ?

3. IN



3. **IN** the anasarca of the lungs, when the disease is not very great, though the patients have considerable difficulty of breathing at their first lying down, yet after a minute or two their breath becomes easy again ; and the same occurs at their first rising. Is not this owing to the time necessary for the fluid in the cells of the lungs to change its place, so as the least to incommode respiration in the new attitude ?

4. **IN** the dropfy of the pericardium does not the patient bear the horizontal or perpendicular attitude with equal ease ? Does this circumstance distinguish the dropfy of the pericardium from that of the lungs and of the thorax ?

5. Do the universal sweats distinguish the dropfy of the pericardium, or of the thorax ? and those, which cover the upper parts of the body only, the anasarca of the lungs ?

6. **WHEN** in the dropfy of the thorax, the patient endeavours to lie down ; does not the extravasated fluid compress the upper parts of the bronchia, and totally preclude the access of air to every part of the lungs ; whilst in the perpendicular attitude the in-



ferior parts of the lungs only are compressed? Does not something similar to this occur in the anasarca of the lungs, when the disease is very great, and thus prevent those patients also from lying down?

7. As a principal branch of the fourth cervical nerve of the left side, after having joined a branch of the third and of the second cervical nerves, descending between the subclavian vein and artery, is received in a groove formed for it in the pericardium, and is obliged to make a considerable turn outwards to go over the prominent part of it, where the point of the heart is lodged, in its course to the diaphragm; and as the other phrenic nerve of the right side has a straight course to the diaphragm; and as many other considerable branches of this fourth pair of cervical nerves are spread on the arms; does not a pain in the left arm distinguish a disease of the pericardium, as in the angina pectoris, or in the dropsy of the pericardium? and does not a pain or weakness in both arms distinguish the dropsy of the thorax?

8. Do



8. Do not the dropfies of the thorax and pericardium frequently exift together, and thus add to the uncertainty and fatallity of the difeafe?

9. MIGHT not the foxglove be ferviceable in hydrocephalus internus, in hydrocele, and in white fwellings of the joints?





A NOTE belonging to Page 58,  
containing a further Account of  
the Patient affected with the Chy-  
liferous Diabætes in the *Stafford*  
Infirmary.

**R**ICHARD DAVIES, aged 33, a  
whitesmith by trade, had drank hard by  
intervals; was much troubled with sweating  
of his hands, which incommoded him in his  
occupation, but which ceased on his fre-  
quently dipping them in lime. About seven  
months ago he began to make large quanti-  
ties of water; his legs are œdematous, his  
belly tense, and he complains of a rising in  
his throat, like the globus hystericus: he  
eats twice as much as other people, drinks  
about fourteen pints of small beer a day, be-  
sides a pint of ale, some milk-porridge, and  
a basin of broth, and he makes about eigh-  
teen pints of water a day.

He tried alum, dragon's blood, steel, blue  
vitriol, and cantharides in large quantities,  
and



and duly repeated, under the care of Dr. *Underhill*, but without any effect; except that on the day after he omitted the cantharides, he made but twelve pints of water, but on the next day this good effect ceased again.

*November 21*—HE made eighteen pints of water, and he now at my request took a grain of opium every four hours, and five grains of aloes at night; and had a flannel shirt given him.

22—MADE sixteen pints. 23—thirteen pints: drinks less.

24—INCREASED the opium to a grain and quarter every four hours: he made twelve pints.

25—INCREASED the opium to a grain and half: he now makes ten pints; and drinks eight pints in a day.

THE opium was gradually increased during the next fortnight, till he took three grains every four hours, but without any farther diminution of his water. During the use of the opium he sweat much in the nights,



nights, so as to have large drops stand on his face and all over him. The quantity of opium was then gradually decreased, but not totally omitted, as he continued to take about a grain morning and evening.

*January 17*—HE makes fourteen pints of water a day. Dr. *Underhill* now directed him two scruples of common rosin triturated with as much sugar, every six hours; and three grains of opium, every night.

19—MAKES fifteen pints of water: sweats at night.

21—MAKES seventeen pints of water; has twitchings of his limbs in a morning, and pains of his legs: he now takes a dram of rosin for a dose, and continues the opium.

23—WATER more coloured, and reduced to sixteen pints, and he thinks has a brackish taste.

26—WATER reduced to fourteen pints.

28—WATER thirteen pints: he continues the opium, and takes four scruples of the rosin for a dose.

*February*



*February 1*—WATER twelve pints.

4—WATER eleven pints: twitchings less; takes five scruples for a dose.

8—WATER ten pints: has had many stools.

12—APPETITE less: purges very much.

AFTER this the rosin either purged him, or would not stay on his stomach; and he gradually relapsed nearly to his former condition, and in a few months sunk under the disease.

*October 3*—MR. *Hughes* evaporated two quarts of the water, and obtained four ounces and half of a saccharine mass from it, like boiled treacle; on the same day four ounces of blood were taken from his arm, the serum of which had a saltish taste.—Hence it appears, first, that the process of digestion resembles the process of the germination of vegetables, or of making barley into malt; as the vast quantity of sugar found in the urine must be made from the food, which he took (which was double that taken by others) and from the fourteen pints  
of



of small beer which he drank. And, secondly, as the serum of the blood was not sweet, the chyle appears to have been conveyed to the bladder without entering the circulation of the blood, since so large a quantity of sugar, as was found in the urine, namely, twenty ounces a day, could not have previously existed in the blood without being perceptible to the taste.

*November 1*—MR. *Hughes* dissolved two drams of nitre in a pint of a decoction of the roots of asparagus, and added to it two ounces of tincture of rhubarb: the patient took a fourth part of this mixture every five minutes, till he had taken the whole—In about half an hour he made eighteen ounces of water, which was very manifestly tinged with the rhubarb; the smell of asparagus was doubtful.

He then lost four ounces of blood, the serum of which was not so opaque as that drawn before, but of a yellowish cast, as the serum of the blood usually appears.

PAPER, dipped three or four times in the tinged urine and dried again, did not scintillate,



tillate, when it was set on fire ; but when the flame was blown out, the fire ran along the paper for half an inch ; which when the same paper was unimpregnated, it would not do ; nor when the same paper was dipped in urine made before he took the nitre, and dry'd in the same manner.

PAPER, dipped in the serum of the blood and dry'd, in the same manner as in the urine, did not run along the paper, when the flame was blown out ; but burnt exactly in the same manner, as the same paper dipped in the serum of blood drawn from another person.

THIS experiment, which is copy'd from a letter of Mr. *Hughes*, as well as the former, seems to evince the existence of another passage from the intestines to the bladder, in this disease, besides that of the sanguiferous system ; and coincides with the curious experiment related in section the third, except that the smell of the asparagus was not here perceived, owing perhaps to the roots having been made use of instead of the heads.

THE rising in the throat of this patient, and the twitchings of his limbs seem to  
P indicate



indicate some similarity between the diabætes and the hysteric disease, besides the great flow of pale urine, which is common to them both.

PERHAPS if the mesenteric glands were nicely inspected in the dissections of these patients; and if the thoracic duct, and the larger branches of the lacteals, and if the lymphatics, which arise from the bladder, were well examined by injection, or by the knife, the cause of diabætes might be more certainly understood.

THE opium alone, and the opium with the rosin, seem much to have served this patient; and might probably have effected a cure: if the disease had been slighter, or the medicine had been exhibited, before it had been confirmed by habit, during the seven months it had continued. The increase of the quantity of water on beginning the large doses of rosin was probably owing to his omitting the morning doses of opium.

NOTE



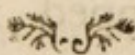
## NOTE belonging to Page 43.

A GENTLEMAN, who had been some weeks affected with jaundice, and whose urine was in consequence of a very deep yellow, took some cold small punch, in which was dissolved about a dram of nitre; he then took repeated draughts of the punch, and kept himself in a cool room, 'till on the approach of slight intoxication he made a large quantity of water; this water had a slight yellow tinge, as might be expected from a small admixture of bile secreted from the kidneys; but if the whole of it had passed through the sanguiferous vessels, which were now replete with bile, (his whole skin being as yellow as gold) would not this urine also, as well as that he had made for weeks before, have been of a deep yellow? Paper dipped in this water, and dry'd, and ignited, shewed evident marks of the presence of nitre, when the flame was blown out.

I BEG leave to add the following circumstance of this case, though foreign to the



argument. He was near fifty years of age, had had the jaundice about six weeks, without pain, sickness, or fever : and had taken emetics, cathartics, mercurials, bitters, chalybeates, essential oil, and ether, without apparent advantage. On a supposition that the obstruction of the bile might be owing to the paralysis, or torpid action of the common bile duct, and the stimulants taken into the stomach seeming to have no effect, I directed half a score smart electric shocks, from a coated bottle, which held about a quart, to be passed through the liver, and along the course of the common gall-duct, as near as could be guessed, and on that very day the stools became yellow ; he continued the electric shocks a few more days and his skin gradually became clear.



NOTE



## NOTE belonging to Page 39.

“ THE valves of the thoracic duct are few, some assert they are not more than twelve, and that they do not very accurately perform their office, as they do not close the whole area of the duct, and thence may permit chyle to repass them downwards.

“ IN living animals, however, *though not always*, yet more frequently than in the dead, they prevent the chyle from returning.

“ THE principle of these valves is that, which presides over the insertion of the thoracic duct, into the subclavian vein; many have believed this also to perform the office of a valve, both to admit the chyle into the vein, and to preclude the blood from entering the duct; but in my opinion it is scarcely sufficient for this purpose.” *Haller El. Ph.* t. 7, p. 226.





## ADVERTISEMENT.

*THERE* are other ingenious Works of the late Mr. DARWIN in the Hands of the Editor, which may perhaps at some distant Time be given to the public, if the medical World seems to require them.



# L I F E O F T H E A U T H O R.

**M**R. CHARLES DARWIN was from his infancy accustomed to examine all natural objects with more attention than is usual: first by his senses simply; then by tools, which were his playthings—By this early use of his hands, he gained accurate ideas of many of the qualities of bodies; and was thence afterwards enabled to acquire the knowledge of mechanics with ease and with accuracy; and the invention and improvement of machines was one of the first efforts of his ingenuity, and one of the first sources of his amusement.

He had frequent opportunities in his early years of observing the various fossil productions in their native beds; and descended the mines, and climbed the precipices  
of



of *Derbyshire*, and of some other counties, with uncommon pleasure and observation. He collected with care the products of these countries, and examined them by such experiments, as he had been taught, or had discovered : hence he obtained not only distinct but indelible ideas of the properties of bodies, at the very time when he learnt the names of them ; and thus the complicate science of chemistry became not only easy, but delightful to him.

ABOUT the age of nine he travelled into *France* with an ingenious botanist, Mr. *Dickenson* of *Blimhill* in *Shropshire*, and thus acquired a taste for that branch of science ; and had at the same time his ear accustomed to the tones of the French language, without taking off his attention from his favourite pursuit of the properties and distinctions of natural bodies.

YE classic schools ! ye not only overcome the struggling efforts of genius, and bind his Proteus-forms, till he speaks the language you require ; but you then divert his attention from the nice comparison of things with each other, and from associating the ideas of causes and their effects ; and amuse him with  
the



the looser analogies, the vain verbal allusions which constitute the ornaments of poetry and of oratory ! — Mr. *Darwin* acquired a competent knowledge of the latin and greek languages, chiefly by reading books of useful knowledge, or which contained the elements of science : and which were more agreeable to him than the monstrous and immoral tales of heathen mythology, or of fabulous history. He was of opinion, that to study these dead languages so accurately as to criticise their beauties, and at a time when all their books of real value had been repeatedly translated, was a prodigality of labour, which might suit the retirement of a pedant, but was unbecoming an active philosopher : that to acquire a taste for greek poetry by years of ill-employed industry, was not much more important than to acquire the power of playing well on some one musical instrument : and that, in the schools of language as in the schools of drawing, a man of science should learn the use of the pen and pencil, as far as they are concerned in the expression or communication of distinct or useful ideas ; but to waste the first twenty years of

U

life



life in learning the metaphors of language, or the drapery of drawing, might serve those, who made poetry or painting a profession; but was liable to disqualify the mind for the more energetic pursuits of business or philosophy.

DURING the time employed in the acquisition of these languages, besides his occasional advancement in botany, fossil history, and chemistry, he had the opportunity of learning the outlines of anatomy; and of applying himself to natural philosophy experimentally; as well as to the elements of algebra and geometry; and, whenever it was in his power, he sedulously sought the society of ingenious men, who were judges of his acquirements and sagacity, and whose attention flattered him, at the same time that their conversation improved him.

NOR amid these acquirements of knowledge was his taste for morality neglected; for his ingenious mother, even to her latest hour! instilled into his breast a sympathy with the pains and with the pleasures of others, by sympathizing herself with their  
distress



distress or exultation : she flattered him into a sense of honour by commending his integrity, and scorn of falsehood, before her friends : and taught him prudence by pointing out to him the ill consequences of the bad conduct of others, whose names or persons he was acquainted with : and as she had wisely sown no seeds of superstition in his mind, there was nothing to overshadow the virtues, she had implanted.

ABOUT the commencement of his sixteenth year he was induced by the advice of his friends to admit himself of *Christ-church* College in *Oxford*, and passed a year rather against his inclination in that University ; where he thought the vigour of the mind languished in the pursuit of classical elegance, like Hercules at the distaff, and sigh'd to be removed to the robuster exercises of the medical schools of *Edinburgh*.

HERE his genius breathed its natural element, sprung aloft, and soared on strong and glittering wing,—till the arrow of contagion reached his flight, and plunged him into the grave!——



Too oft, when virtue launches her adventurous skiff to save her wreck'd companions, she perishes in the wave herself!—Such is the government of this world!—

At this University he not only heard the numerous medical lectures with unwearied attention, duly visited the general hospital, assisted his much-valued friend Dr. *Duncan*, in his public dispensary \*, was busied in the disputations, and treatises of the medical societies; but undertook the care, and attended with diligence all the sick poor of the parish of *Waterleith*, and supplied them with the necessary medicines.

HERE it was, about the end of *April*, that he had employed the greatest part of the day in accurately dissecting the brain of a child, who had died of the hydrocephalus internus—That very evening he was seized with severe headach, to which on the next morning febrile symptoms supervened, with delirium, petechiæ, hæmmorrhage, paralysis of the bladder, and other circumstances of extreme debility which terminated in death.

THE

\* Medical Cases, by Dr. *A. Duncan*, Preface and Page 353.



THE following character is extracted from the medical and philosophical commentaries, published periodically at *Edinburgh*, vol. 5, p. 332, and v. 6, p. 227.

“ THUS was the medical world deprived of a young man, from the continued exertions of whose industry and genius there was reason to entertain the most sanguine expectations: with great natural acuteness he possessed the most unremitting industry; and during his three years residence at *Edinburgh* to receive and communicate information constituted his greatest pleasure. This admirable young man, whose early exertions were thus calculated to raise such high expectations, was cut off ere he had reached the twenty-first year of his age. By his death the public has been deprived of an individual, by whose genius and industry the art of medicine might have been much improved: his teachers have lost a pupil, who might have been the boast of every seminary of education, where he happened to have been placed; and those, who were the companions of his studies, have been bereaved of a friend, to whose extensive knowledge



ledge and deep penetration they could have had recourse on every difficulty."

" A MARBLE monument is erected to his memory in the church-yard belonging to the chapel of *St. Cuthbert*, at *Edinburgh*, on which is the following inscription :—




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#### ERRATUM.

Page 55, l. ult. pro. *acid* lege *acrid*.



CHARLES DARWIN,

was born at LICHFIELD,

*September 3, 1758;*

and died at EDINBURGH,

*May 15, 1778.*

Possessed of uncommon Abilities and Activity  
he had acquired Knowledge in every Department of Medical and Philosophical Science, much beyond his Years.

He gained the FIRST MEDAL offered by the  
ÆSCULAPIAN SOCIETY for a Criterion  
to distinguish

MATTER from MUCUS;

and had prepared a THESIS for his Graduation on

The RETROGRADE MOTIONS of the  
LYMPHATIC VESSELS in some  
Diseases.

He cultivated with Success, the Friendship of  
ingenious Men, and was buried by Favor of  
Dr. A. DUNCAN in this his Family-Vault.

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*Fame's boastful chissel, Fortune's silver plume,  
Mark but the mouldering urn, or deck the tomb!*



# CHARLES DARWIN

was born at Shrewsbury

February 12, 1809

and died at Down House

April 19, 1882

He was a naturalist and geologist  
and his theory of evolution  
has been one of the most important  
contributions to science since the  
beginning of the 19th century.

## MATTHEW MUCCH

and had a large collection of  
minerals and fossils.

He was a member of the  
Royal Society and the  
Geological Society.

He was a very successful  
businessman and a  
very popular lecturer.

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