ESSAYS AND OBSERVATIONS.

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VOLUME I.

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M, DCC, LXXI.

TO

Sir HANS SLOANE, Bart.

PRESIDENT;

AND

To the Council and Fellows of the ROYAL SOCIETY OF LONDON, for improving Natural Knowledge:

Most and much Honoured,

THE glorious example given to the world by the ROYAL SOCIETY, has made such an advantageous change in Natural Knowledge since the middle of last century, that the first fruits of all labours of this kind become in justice due to the first and great promoters of it.

THE juſt ſenſe of this determines us to offer to your protection the following Sheets, deſigned to improve one branch of that extenſive Science of Nature, which you cultivate with ſo much Honour to yourſelves, and advantage to Mankind. We are,

GENTLEMEN,

Your moſt obedient, and

moſt humble Servants,

The COLLECTORS.

THE PREFACE.

NO complaint is more general among thoſe who apply to the ſtudy of any liberal ſcience, than their being under a neceſſity of peruſing ſuch numbers of books as are wrote on the ſeveral parts of each of them: A labour that can have no end, ſince one book ſerves only as an introduction to another, while a few pages might contain all that is new or valuable in moſt of them. It muſt, however, be confeſſed that many good and uſeful remarks and diſcoveries are loſt, by the unwillingneſs of ſome ingenious men to appear in print, and by others having neither time nor inclination to compoſe a ſizeable treatiſe, who would communicate neceſſary and beneficial obſervations to the world, if they had a proper opportunity to do it in a ſheet or two.

One probable method of remedying theſe two diſcouragements to learning is, to publiſh collections of ſmall treatiſes, ſubmitted to the exa-

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mination of a ſociety of ſuch who had particularly ſtudied the ſcience which is the ſubject of each tract; and who ſhould give ſome ſhort account of the moſt remarkable and uſeful diſcoveries and improvements made by the contemporary authors in their own profeſſion; by which we would ſoon have more authors, and fewer books, to the great advancement of learning, and abridging of our ſtudies.

There is no ſcience in which there is more reaſon to complain of the abuſes above mentioned than in Medicine, as evidently appears on viewing the catalogues of the *Scripta medica*; for, though the numbers and ſizes of books are very great, how few of them are in eſteem? and of theſe much the ſmaller ſhare is wrote with a view to promote the principal part of medicine, the knowledge and cure of diſeaſes, which chiefly depend on obſervations of facts that ought to be frequently repeated before any certain axiom in phyſic can be built on them; and of which there is ſuch a variety as might afford an inexhauſtible ſubject of obſervation, though there were no changes made at any time in the ſtate of phyſic: But, from what we are certainly informed of in the hiſtory of this ſcience, there ſeems to be a neceſſity, not only to ſtudy and improve the obſervations of thoſe who went before us, but for the phyſicians of every age to collect others for their own uſe, and the advantage of their ſucceſſors; ſince very often they cannot be aſſiſted by any older writer, becauſe ſeveral new [illegible] unknown to our anceſtors, diſcover

diſcover themſelves; names both of diſeaſes and drugs change, and are differently applied; improvements and diſcoveries are daily made; medicines at one time in the higeſt reputation are ſoon laid aſide, and others are ſubſtituted in their place; and the form and manner of uſing thoſe ſtill retained are perpetually diverſified.

Phyſicians muſt be very ſenſible of theſe inconveniences, in reading the works of the firſt great improvers of medicine by obſervation, the Greeks; nor are they leſs evident in the Arabians, who ſucceeded and copied after the Greeks: As we deſcend nearer to our own time, ſome of theſe difficulties are indeed gradually removed, though it is to be regreted, that the ſucceſſion of different philoſophies prevailing in the theory, has continued other difficulties in the practice of medicine.

Beſides theſe general arguments for phyſicians continuing to make and communicate obſervations, we of the Britiſh dominions have particular reaſons, more than ſome of our neighbours, to be employed this way, ſeeing we have been favoured with very few medical obſervations of our own; and, on the other hand, our climate, way of living, and other circumſtances, which ought to be greatly regarded in the cure of diſeaſes, are very different from moſt inhabitants of the continent; to which may be added, that every nation has its own prevailing mode of preſcribing. On theſe accounts young practiſers

fers must be under the greatest difficulty to accommodate foreign observations, which they must have recourse to, to the constitutions of their countrymen, and to the then fashionable *formulæ* of medicines.

These reasons already mentioned, which are founded on the nature of the subject itself, ought certainly to incite us to obviate such difficulties; and the necessity of establishing physic on a better footing among us will still appear in a stronger light, upon taking a view of the different manners in which observations are handed down to us.

Those who publish volumes of their own practice, improvements, and discoveries, undertake a task very difficult to be executed as it ought, because of the qualifications necessary for it, which chiefly are Sagacity and Knowledge, to guard against errors and mistakes in the names and nature of things, and to distinguish between trite and trifling facts and such as are necessary to be remarked; Accuracy, to omit no essential circumstance; and Candour, to conceal nothing material. These are qualities not so frequently to be found all conjoined in one person; either nature has not been bountiful enough, or temptations are strong. Vanity and interest are powerful motives to make us magnify our own successes, conceal our mistakes, and wish the world would believe us ignorant of no disease or its cure. Human nature is subject to such infirmities: And there have not been wanting critics,

tics, who have endeavoured to fix failures in some one or other of these articles on numbers of our modern observators; We wish we could justly exculpate them.

If we ought therefore to be cautious in giving an implicit credit to original authors, we must be no less on our guard in consulting the voluminous compilers, who indifferently collect from all books every case relating to the title of their sections or chapters.

Several collections of observations communicated to some considerable men by their correspondents have been published, and seemed to promise more accuracy and candour, by passing through the hands of a Censor equal to the task; but even in these we find plain marks of the publisher's too great complaisance, or of his fear to offend. The only collections of this kind that we know to be continued of late, are the *Acta Medica Berolinensia* and *Acta Wratislaviensia*; both these at least labour under the disadvantages common to all foreign observators. The first seems to be wholly composed by the publisher, without assistance, or very exact memoirs from any friends; and the second is in a language (the High-Dutch) very little understood by the British, and contains many papers foreign to the immediate improvement of physic. But, allowing these collections to be put on the best plan, it might be presumed that a society, of which every member has his particular task assigned him, to be [illegible] behind the curtain,

tain, would be as free from a faulty complaisance or fear, and as capable of performing the work to advantage, as one gentleman who is engaged in private practice, and publicly known for the author.

The last method of communicating observations to the public, has been in collections made by societies; the most conspicuous of which are the *Royal Society* in *London*, the *Academie Royal des Sciences* at *Paris*, the *Academia Scientiarum Imperialis* at *Petersburgh*, and the *Academia naturæ curiosorum* in *Germany*; all instituted by public authority, for the advancement of natural knowledge, under which the several branches of medicine are comprehended.

The *Philosophical Transactions*, and *Memoires de Mathematique et de Physique* are valuable treasures, that public libraries cannot be without, and all learned men wish to possess, in the numerous volumes of which many parts of medicine have been treated with the utmost accuracy and ingenuity: But the constitution of the English Society and French Academy does not allow them to insert several things which a plan calculated only for the improvement of physic would easily admit; and it is to be regreted that their papers are not so universally purchased as they ought, by those who are employed in medicine, because the greater share of the tracts are not immediately relative to their proper business, but treat of natural history, mechanics, astronomy, abstract mathematics, &c.

The

The *Peterſburgh Tranſactions* are yet of ſhort ſtanding, two volumes being only publiſhed, and are ſo much on the ſame plan with the former two, that we need not mention any further reaſons why, in our opinion, a plan might be contrived that would be more generally peruſed by the ſtudents and practitioners of the different branches of phyſic.

The collections of the *Academia naturæ curioſorum* appear to be more calculated for the immediate improvement of medicine than any of the former; but, beſides containing many papers of natural hiſtory and philoſophy, and being liable to the inconveniencies of other foreign obſervations, they omit ſeveral neceſſary articles, which, in our opinion, ought to be taken in.

The remarks we have made on the different manner in which obſervations have been communicated, are by no means deſigned ſo much as to inſinuate the uſeleſſneſs of conſulting ſuch authors: On the contrary, none can be more ſenſible than we are of the advantages may be reaped from them by thoſe who have knowledge enough to make a right uſe of them. All we would be underſtood to infer is, that the charges of ſome, and the mixture of other ſciences with the medical papers, prevent their being ſo generally ſought after; others are not calculated for our climate and practice; and ſome are to be read with caution: From all which we would conclude, that a collection of obſer-

obſervations wholly relative to medicine, made in our own country, and candidly and accurately related, would be the moſt effectual way to improve phyſic among us.

Though we have hitherto principally inſiſted on the neceſſity of obſervation, as, in our opinion, the moſt eſſential part of Phyſic, we are not unmindful how much is ſtill wanting to complete the *theory* of medicine, which we think would alſo be ſooneſt and beſt done by ſmall Eſſays, where an author having but a little field to cultivate, would certainly treat his ſubject with much more exactneſs, than when he lies under the neceſſity of writing up to the ſize of a book, where, either for the ſake of two or three pages, he muſt repeat what has been ſaid hundreds of times before him, or muſt undertake to diſcuſs more ſubjects than either his genius, reading, ſtudy, or inclination would otherwiſe induce him to attempt.

The deſire we have to remove the diſadvantages which, in our opinion, medicine lies under on all theſe accounts, is the only motive that prevailed with us to undertake a yearly collection of Medical Eſſays and Obſervations, of which we now publiſh the firſt volume on the plan mentioned in our propoſals, which we ſhall here preſent the reader with, that he may at one view be let into the whole deſign; and we earneſtly beg to be acquainted by the learned gentlemen in phyſic, of what they think ſuperfluous and deficient in our ſcheme, that

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this work may be made as generally useful, as we most solemnly do declare we intend it.

It is proposed that each volume of MEDICAL OBSERVATIONS *and* ESSAYS, *collected, revised, and published by a Society at* Edinburgh, *should contain,*

I. A register of the height of the barometer, degrees of the thermometer and hygroscope, the quantity of rain that falls, the direction and force of the wind, and state of the weather at Edinburgh for twelve months, compared with observations of the same kind communicated by correspondents.

II. An account of the diseases which have been epidemic, or most universal in Edinburgh, in the several seasons of the preceeding year, with an extract from the records of burials; which shall also be compared with any accounts of the same nature sent from other places.

III. Observations and essays on the following subjects; 1. History of any part of physic. 2. Simple drugs. 3. Compound galenical medicines. 4. Chemical operations and experiments. 5. Anatomy. 6. Animal œconomy. 7. Theory. And 8. Practice of surgery and physic.

IV. Figures necessary to explain instruments, operations, descriptions, &c. in any of the foregoing tracts.

V. Discoveries or improvements made any where else in the several branches of medicine.

VI. An alphabetical index of the contents.

That the design and usefulness of this work may be more fully understood, we shall first consider the share of it which we undertake, and then shall give our opinion of the other parts with which we expect to be furnished by the learned gentlemen who shall please to favour us with their correspondence.

1. The Register of the Barometer, &c. will, we hope, not only be acceptable to all lovers of natural knowledge, but is absolutely necessary to be compared with the epidemical constitution, in order to determine a fact, concerning which two of the greatest and best observators in physic, Hippocrates and Sydenham, seem to differ; Hippocrates * appearing to assign the different manifest constitutions of the air, as the causes of epidemic diseases, and Sydenham † affirming such diseases to depend on some undiscovered quality of the air, and not upon any of the sensible changes in it.

2. Whatever relation may be found between the changes in our atmosphere and the epidemic diseases, all seem to agree, that there are certain circumstances and symptoms which distinguish the return of similar constitutions, and point out the most probable method of success in treating

* Epidemic. lib. 1. § 3. & ubique, De humor. p. 56. De natur. hominis, 227.

† De morb. acut. [illegible] cap. 2. cui titul. de morb. epidem. p. 5. Sect. 1. monit. p. 486.

treating diſeaſes while ſuch conſtitutions prevail. The only way of diſcovering certainly theſe circumſtances and ſymptoms, is a long continued ſeries of obſervations, which we hope our work will ſupply.

3. We are to reviſe all the particular obſervations and eſſays tranſmitted to us, and to reduce them to the moſt convenient order, publiſhing each in the author's own words; only we beg to be excuſed, if we delay to inſert any paper which appears to us deficient in facts, or not ſo methodical, till theſe circumſtances, of which we ſhall inform the author, are cleared up. We do not however pretend by this power to reject obſervations, though ſome circumſtances are omitted, if they are otherwiſe uſeful, nor to ſuppreſs eſſays that are ingenious, though the propoſitions they contain are contrary to our way of thinking. All we propoſe by reſerving this choice of papers, is to acquaint the author of ſuch omiſſions or objections as might be taken notice of, that, by ſupplying and correcting them, the work may be made more acceptable to the public; and therefore we perſuade ourſelves, that this part of our labour will prove one of the greateſt encouragements to procure us correſpondents.

4. We ſhall overſee the engraving of neceſſary figures, and ſhall return the originals, if demanded, as ſoon as the graving is finiſhed.

5. We ſhall give a ſhort account of the improve-

provements and discoveries made any where else, that are of general use; to which shall be annexed a list of the medical books published during the currency of our year, with such as are proposed or promised to be soon printed; and any other piece of literary news that shall seem to conduce to the advancement of physic.

6. We shall take care to make the index full and compleat.

The manner in which each subject expected from our correspondents should be treated, is in our judgment:

1. In historical essays, the proper vouchers are to be particularly quoted.

2. The descriptions and virtues of simple drugs are to be clearly and succinctly told, without enlarging on arguments *a priori*, which are too liable to lead into error.

3. The proportions and method of preparing compound medicines are to be narrated, without concealing any ingredient, or the manner of using them.

4. Chemical experiments and preparations are to be fully described, as to ingredients, vessels, furnaces, degree of heat, time of operation, &c.

5. An-

5. Anatomical discoveries are to be accurately described, and the easiest method of searching out the discovered parts is to be related.

6. In all questions and disputes relating to the animal oeconomy, theory and practice of medicine, we desire all personal reflections and offensive terms may be shunned.

7. The histories of morbid cases, whether in physic or surgery, are to be related without any theorical reasoning on the nature of the disease, &c. unless some particular circumstances require to be illustrated; which may be done by a short note at the foot of the page. It is therefore expected that such histories will only be a clear and succinct narrative of facts, in which the patients age, sex, constitution, former way of life, diseases to which they have been subject, or any other circumstances which serve to explain the present case, are to be remarked. If any manifest cause of a disease has been known, it is to be mentioned. All the symptoms, with the state of the pulse, appetite, thirst, sweat, urine, foeces, &c. are to be set down; and the sequel is to be an exact account of the symptoms, medicines prescribed, their evident effects, and of the event, whether into health, some other disease, or death. If the patient died, and a dissection was allowed, the parts preternaturally affected in their situation, texture, &c. are to be described.

8. Unsuccessful cases, or even mistakes in the nature of the disease, or in the practice, when known,

do very often more ſervice to practiſers in medicine, than ſeveral ſucceſsful caſes, ſince they are ſo many warnings from falling into the ſame miſtake: We therefore beg our correſpondents to acquaint us of ſuch, if they ſhould happen, declaring we will not publiſh ſuch accounts, unleſs they are ſent by the phyſician or ſurgeon immediately concerned; and that we will, if deſired, ſuppreſs the name of any gentleman who has candour and honeſty enough to acknowledge his miſtake, and to make the world wiſer in an uncommon way.

8. There is no more deſired than an open full detail of the improvements in either phyſic or ſurgery.

9. Where two or more phyſicians or ſurgeons are employed in treating the ſame patient, or in making the ſame experiment, it is to be wiſhed they would write the caſe or account of the experiment conjunctly, or at leaſt that he who relates it would do it with all fairneſs and ingenuity, without diſcovering partiality for his own opinion, or diſputing againſt the ſentiments of others.

10. Seeing we propoſe, when there is occaſion, to ſend our correſpondents remarks on their papers, it will be neceſſary that each gentleman ſhould write his name, deſignation, and full addreſs in the papers he deſigns to tranſmit to us.

11. The language wherein it will be moſt acceptable to us to have the obſervations and eſſays wrote,

wrote, is Engliſh, in which the whole work is deſigned to be publiſhed, not without ſome regret on our part; becauſe we, and probably ſome of our correſpondents, might have been more certain not to tranſgreſs at leaſt in Latin rules of grammar: But ſeveral obvious enough and more forcible reaſons diſſuaded us from this language; and tho' we may not write pure Engliſh, which cannot be expected from our country, yet we would willingly hope we may be able to expreſs ourſelves intelligibly, which is the principal thing in a work of this kind, where elegance of ſtyle cannot be expected, and wit would be hurtful. If the learned world ſhall ever think our collections deſerve to be more generally underſtood, we are willing to contribute all in our power to their appearing in a more univerſal language.

Beſides what is propoſed by the general ſcheme, we have inſerted into this firſt volume a deſcription of Edinburgh; and of the inſtruments wherewith the meteorological obſervations were made. The firſt is done only with a medical view, that is, we have remarked the ſituation and other particulars of Edinburgh, which we think can influence the ſtate of the air, or occaſion diſeaſes; and the mechaniſm, ſituation, &c. of each inſtrument are neceſſary to be known, that the obſervations may be compared with others. We beg all our correſpondents to premiſe ſuch deſcriptions alſo to their accounts of the ſtate of the air, and epidemic diſeaſes, without which compariſons cannot be made.

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We have alſo publiſhed here the full regiſter of daily obſervations made with the Barometer, &c. that we might ſhew the method uſed by us, and we deſire the opinion of the curious learned, whether we ought, in the ſucceeding volumes, to continue this regiſter in the ſame form, or if we ought to abridge it as it is done by the French Academy.

We chuſe to begin our regiſter, &c. of our medical year with the month of June, becauſe then the vernal diſeaſes are wore out, and a new conſtitution is not begun; whereas if we had followed the example of moſt other ſocieties, by beginning with January, we muſt have broke in upon the middle of the moſt violent epidemic diſeaſes that happen in this place.

We cannot conclude without returning thanks to the gentlemen who have furniſhed the materials for this firſt volume, and muſt preſume, that their example, and this convincing proof of our being in good earneſt to execute our propoſals, will ſoon encreaſe our correſpondence. We are perſuaded our work will be acceptable to the public, if the papers tranſmitted to us hereafter are as uſeful and ingenious as thoſe we now publiſh.

We muſt likewiſe aſk pardon of ſome gentlemen whoſe papers we have been obliged to reſerve till next volume is publiſhed, leſt we ſhould have made this too bulky. Our only rule in the choice of papers at preſent has been to withdraw thoſe

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that were ſent us by correſpondents, from whom we had received others that are here publiſhed; which we thought the ſureſt way of ſhewing as equal a regard for all, as the plan, to which we had reſolved to reſtrict ourſelves, would allow.

CON-

CONTENTS.

XXII. *An*

MEDICAL

MEDICAL

ESSAYS

AND

OBSERVATIONS.

ARTICLE I.

The Description of EDINBURGH.

THE City of EDINBURGH is placed in 3 degrees of longitude west from London, and in 55° 55′ of northern latitude, is about a mile long, and, in several parts, near half as broad. It stands chiefly on the ridge of a hill, which, at its lowest part, the Palace of Holy Rood House, is 94 feet higher than the level of the sea, and gradually ascends from thence, in a direction betwixt the points W. by

S. and W S W. to its higheſt part, the Caſtle-Hill; the perpendicular height of this aſcent being 180 feet. All this ridge of a hill is one large fine ſtreet, which is divided near the middle by croſs building, and a gate, (the Nether-bow). The upper diviſion is properly the city, and commonly is called the High-Town, and the lower half is named the Canongate.

The lanes (cloſes) going off from the high-ſtreet, are narrow and ſteep, eſpecially thoſe of the north-ſide, on which ſide the houſes are not continued down to the foot of the hill, but on the brow there are gardens between the buildings and the freſh water lake (the Nore-Loch). On the ſide of this loch neareſt the town, the butchers have their ſlaughter houſes, and the tanners and ſkinners their pits. Several lanes (the wynds) on the ſouth-ſide of the ſtreet are larger, and not ſo ſteep as the others above mentioned, are built on both ſides, and terminate in a narrow ſtreet (the Cowgate) that runs parallel every where with the high-ſtreet. It is a common tradition that this low part of the town was formerly a loch, in regard of which the one now remaining on the oppoſite ſide of the city was called Nore-Loch; and there are now plenty of ſprings every where in the Cowgate; and, after violent rains, the water makes its way, in great quantities, through the floors of the ground ſtoreys there. From the Cowgate, other lanes are continued ſouthwards to the city-wall, which is built on another ridge, almoſt parallel to the High-ſtreet: Where theſe lanes are not, there are gardens, burying places, &c. within the wall; and

and beyond it, from the gates, are some large suburbs.

Between the low street or Cowgate and this south-wall, most of the brewers have their work-houses, for the convenience of water.

The Canongate or lower part of the town, the larger share of which is properly without the liberties of the city, has narrow lanes going off from each side of the street; but, the houses not being built far down, there is considerable space for gardens, that are all planted and laboured.

The houses in Edinburgh are of stone, and are allowed by law to be five storeys high to the street, but are generally higher backwards. They are built very close on each other; and one stair often serves two houses, each of which contains a family in every storey; the height of the houses, narrowness of the lanes, and number of people entering by one stair, may therefore in some measure apologize for neither stairs nor lanes being so clean as in some other places where such crowds are not confined to such a narrow spot of ground.

No river nor rivulet runs through the town, or nearer it than three-fourths of a mile; but the city is plentifully provided with fine spring water, conveyed about three miles through leaden pipes. The markets are here plentifully furnished with fleshes, fishes, fruits, herbs and roots. The common draught is small ale sold at two-pence a pint, which is about $4\frac{1}{2}$ pounds apothecary-measure, the people of fashion having plenty of claret, and all other sorts of wines. All except the poorer labourers use wheat-bread;

these indeed feed much on oat-meal: And all sorts burn pit-coal in their fires.

The number of inhabitants in Edinburgh and Canongate is reckoned to amount to some hundreds more than thirty two thousand, allowing the number of those that die to be one thirtieth of the whole, or estimating every family to consist of five persons; this we judge to be rather too small a calcul for such a crowded healthy place as this is.

This cursory view of the city itself is sufficient for our purpose; and therefore we shall next consider its neighbourhood.

At the upper end of the High-street there is a large piece of waste ground (the Castle-hill), at the west end of which, the Castle is raised on a very high rock, and commands the whole town. The Nore-loch begins on the north-side of the foot of the castle-rock, and is continued at the foot of the ridge on which the town stands, for about three-fourths of the high-street, being at its westmost half 300 feet broad, and only 250 in its lower half. The ground on the north-side of this loch is not so high as that on which the town stands. The Canongate is over topp'd on its north-side by a contiguous craggy hill (the Calton Craigs). Beyond the lowest extremity of the Canongate, a sloping plain runs eastward to the sea; but, to the south of Holy-rood-house, two very high hills (Arthur's Seat and Salzberry Craigs) are at a very little distance. The ground to the south of the Canongate is rather higher than the houses there; but the ground to the south of the High-Town is much in a level with it, and has considerable suburbs built on it; and towards the

Castle-

Caſtle-hill the High-ſtreet is much higher than any place at a mile's diſtance.

Thus we ſee the caſtle higher than the town between W. S. W. and W. by S. The Calton Craigs is interpoſed between ſome part of the town and the N. E. winds, and protects the Canongate on the north; Arthur's Seat and Salzberry Craigs are a defence from the E. and the ſouth-ſide of the Canongate and Cowgate are defended by their low ſituation: While the High-Town is open from the weſt to the N. E. point, and from the W. S. W. to the E. S. E. and all parts of the town are open to the winds between N. E. and E.

At two miles diſtance from Edinburgh, weſtward, are the Corſterphin hills, ſomewhat higher than the city. At a mile's diſtance from the middle and lower part of Edinburgh, where the town of Leith is built, is the Frith of Forth, which is a branch of the German Ocean that begins to be land-lock'd at twenty miles E. N. E. diſtance, and gradually becomes narrower to the place juſt now mentioned, where it is commonly ſaid to be ſeven miles in breadth, but it is only about five; and then the ſhore advancing northward, while the town is turned ſouthward, the diſtance between the town and Frith is gradually increaſed. The Frith is ſtill more and more ſtraitened, till it is named the River of Forth. The tide however riſes at ſome more than twenty miles diſtance from Edinburgh.

Ten miles ſouth from Edinburgh are very high hills (Soutry hills) extended from weſt eaſtward; and at two miles diſtance on the ſouth of the high town are two hills (Blackford and Braid) higher

higher than any part of the town. And five miles south, the great range of Pentland Hills, which are extended many miles S. W. take their beginning; betwixt which and Corstorphin hills, with some others beyond these, a fine spacious plain is extended for a great many miles westward from the castle, and is watered with several rivulets.

II. *A Description of the* INSTRUMENTS *with which the Observations in the* Meteorological *Register were made.*

THE Barometer is a simple portable one, the tube of which is about a fourth of an inch diameter in its bore, and has a proportional large cistern for the stagnant mercury. It is kept in a chamber at the height of 270 feet above the level of the sea, as we calculated, by carrying this instrument to the sea shore, when the mercury was perfectly stationary; and allowing, according to Dr Halley's computation, (confirmed by experiments we tried), 90 feet perpendicular height for every tenth of an inch, which the mercury rose in the barometer, as we descended.

The different heights of the mercury in the tube at the several times of observation are marked in the register by inches and tenths of inches British measure, which we have also made use of in determining the degrees of the thermometer and hygroscope.

The Thermometer used in our observations, is the common glass-ball and small tube, containing

containing colour'd alcohol, and ſealed hermetically at the top. The freezing point is at 8 inches, 2 tenths; and the heat of a man in health raiſes the ſpirits to 22 inches, 2 tenths.

Our Hygroſcope is a whip-cord with a plummet appended, which we have endeavoured to make more capable of being compared with other ſuch inſtruments, than is commonly practiſed, by aſcertaining two fixed points in the following manner. We kept the cord very near to a conſtant fire for ſeveral weeks, and afterwards put it into a warm oven till it was ſo dry that we could ſcarce make it ſtraight without breaking; then, having put the end of it through the noſe of a funnel, to be ſecured within the funnel, by the iron pin on which it was afterwards to be hanged, we ſtuffed the noſe of the funnel with ſpunge, and poured water into the funnel to trickle down along the cord. We ſupplied new water conſtantly, till the plummet would neither turn round, nor riſe any more with the water which the cord received in this way, nor by ſoaking it in water nor by ſteams of hot water, but began to untwiſt as ſoon as we forbore ſupplying the ſteams or water. This operation we repeated four times, and always found that the difference in the length of our cord, when fully dried, to its length when fully wet, was four $\frac{1}{4}$ inches. The point of greateſt dryneſs on the ſcale from which this article of the regiſter is taken, is at five tenths of an inch, and the point of the fulleſt wetneſs is five inches.

We

We muſt likewiſe remark, that the Thermometer and hygroſcope are kept in a ſquare wainſcot box, placed on the weſt-ſide and without the ſaſh of a north window of the ſame chamber where the barometer is. The box is very tight on every ſide, when the door of it is ſhut, except in the ſide next the ſaſh, where a great many large holes are made. By the ſituation and make of this box, neither the ſun, or rain, nor the fire and company in the chamber, can have any bad effect on the inſtruments within it, and the air has open free acceſs to them.

The direction of the wind is obſerved by the weather-cock of the high ſteeple of St. Giles's Church, which is the only tolerable place or inſtrument for making this ſort of obſervation, in a city ſituated as ours is.

We were reſolved to have determined the force of the wind very exactly, and for that purpoſe had contrived two inſtruments, one of which ſhould ſhew the force at the time when the obſervations with the other inſtruments were made; and the ſecond ſhould have pointed the greateſt force the wind had, between the times of obſervation. But, not finding any place for ſetting them up, where the wind could have its full effect, and the obſervator could have eaſy acceſs, we laid aſide that deſign, and have followed Dr Juryn's directions of judging by our ſenſes, without the help of any machine, and, in the tables, have marked the ſeveral degrees thus, 0, 1, 2, 3, 4. By 0 is denoted a perfect calm; by 1, ſuch a ſmall wind as ſcarce moved the leaves of trees; by 4, a hurricane; and by 2, 3, intermediate forces.

The

The inſtrument by which we have determined the depth of rain that falls, is, 1. A funnel of 28 inches diameter at its brim, placed at the top of a garden-wall, about the middle height of the city, and free from all over-topping houſes or trees; and, to prevent evaporation as much as poſſible, a large ſhare of the body and the noſe of the funnel are ſunk into a large very thick box of wood in which a narrow-neck'd receiver is placed, that allows the end of the noſe of the funnel to enter it. 2. The gage in which the water is meaſured, is a cylindrical glaſs, whoſe diameter is exactly 2. 8 inches, or one tenth of the diameter of the funnel, and has its diviſions into inches, and tenths of inches, exactly marked on its length with a diamond. The difference of the diameters of the funnel and of the gage readily ſhows, that one hundred part of what is meaſured in the gage, is only to be reckoned as the true quantity that falls, which we have ſet down in inches and decimals of inches.

III. *The Meteorological* REGISTER.

AFTER what has been remarked in the preceeding account of the inſtruments, there is very little more neceſſary to be explained, in order to underſtand the following regiſter; for we expect it will be readily known, that we always uſe the Julian or old ſtyle in determining the months and days of our obſervations; and the letters on top of the columns will eaſily explain what is contained in each. Nor is it difficult to follow out in the ſame continued line every obſervation that was made at the different hours of the forenoon, (a. m.) or afternoon (p. m.) ſet down in the ſecond column. In the column under wind, the point from which it blowed is marked by the initial letters of its common name in the compaſs, and its force is determined by the cyphers. The appearance of the ſky is told in the column of weather; and, where the pricked lines are carried out to the laſt column, the receiver of the rain was examined, but no water was found.

JUNE

JUNE 1731.

D.	Hour.	Baro. In. D.	Ther. In. D.	Hyg. I. D.	Wind. Dir. For.	Weather.	Rain. In D.
1	10 a m	30 1	15	61 8	S W by S 1	fair	—
	5 p m	30 1	16	01 6	S W by S 0	cloudy	
2	9 a m	29 9	15	31 7	S W 1	cloudy	
	5 p m	29 9	15	91 7	W 2	cloudy	
3	10 a m	30 0	14	42 1	W 1	cloudy	
	4 p m	30 0	14	02 3	N W 1	rain	
4	9 a m	29 9	12	21 7	N W 2	cloudy	0,063
	5 p m	30 0	13	01 5	N W 2	cloudy	
5	9 a m	30 0	10	61 9	N W by N 2	hail	0,022
	4 p m	30 0	12	71 6	N 1	cloudy	
6	8 a m	30 0	12	42 1	N W 1	cloudy	—
	4 p m	30 0	13	71 8	N W 1	cloudy	
7	9 a m	30 0	12	22 3	N E 1	cloudy	0,02
	5 p m	30 0	12	72 0	N E 1	fair	
8	9 a m	30 0	13	52 1	W 1	cloudy	—
	5 p m	30 0	15	21 7	W by N 1	cloudy	
9	7 a m	30 0	13	21 9	W 1	cloudy	—
	5 p m	29 9	15	02 0	W 0	cloudy	
10	7 a m	29 7	13	31 8	W 0	cloudy	—
	5 p m	29 6	13	82 1	W 0	rain	
11	11 a m	29 5	14	41 8	W 1	cloudy	0,098
	7 p m	29 6	13	82 0	W 1	cloudy	
12	9 a m	29 8	13	32 3	N E 1	cloudy	—
	6 p m	29 8	12	92 5	N E 1	cloudy	
13	10 a m	29 7	13	02 6	N E 1	cloudy	—
	4 p m	29 7	13	2 4	N E 1	cloudy	
14	8 a m	29 8	12	2 9	N E 1	cloudy	—
	5 p m	29 8	13	1 6	N E 1	fair	
15	10 a m	29 8	14	4 2	N by W 1	fair	—
	5 p m	29 9	13	5 5	N by E 1	cloudy	
16	9 a m	29 9	12	23 2	N E 1	cloudy	—
	4 p m	30 0	12	93 0	E by N 1	hazy	
							0,106

JUNE 1731.

D.	Hour.	Baro. In D.	Ther. In D.	Hyg. I. D.	Wind. Dir. For.	Weather.	Rain.
							0,206
17	9 a m	0 0	12 0	2 9	E 1	cloudy	//
	4 p m	0 0	12 3	2 8	E 1	cloudy	0,012
18	9 a m	0 0	11 5	3 1	E 1	cloudy	0,002
	5 p m	29 9	12 7	2 5	E 1	fair	
19	9 a m	29 8	12 7	2 5	E by N 1	fog	——
	5 p m	29 8	12 8	2 8	E by N 1	fog	
20	9 a m	29 5	12	3 3	E by N 1	fog	0,064
	6 p m	29 5	12 6	2 6	E by N 1	cloudy	
21	8 a m	29 4	12 3	2 2	N by W 1	cloudy	0,075
	4 p m	29 4	13 5	1 5	N by W 2	cloudy	
22	8 a m	29 5	12 0	1 5	N W 2	cloudy	——
	5 p m	29 5	13 8	1 2	N W 1	cloudy	
23	9 a m	29 5	12 1	2 0	S E 1	rain	0,185
	5 p m	29 5	12 3	3 0	E by N 1	rain	
24	9 a m	29 5	13 7	2 8	E by N 2	fog	0,176
	4 p m	29 4	14 6	1 9	S W 2	cloudy	
25	8 a m	29 2	13 9	2 0	S 2	cloudy	0,255
	7 p m	29 1	14 1	1 8	S 2	rain	
26	9 a m	29 5	13 5	2 [illegible]	W 0	cloudy	0,00
	3 p m	29 6	13 3	2 0	W 1	fair	
27	9 a m	29 6	[illegible] 1	3 3	N E 2	rain	
	4 p m	29 6	11 4	3 2	N E 2	rain	
28	9 a m	29 5	11 4	3 7	N E 2	fog	1,060
	5 p m	29 6	12 4	3 3	W 1	fog	
29	9 a m	29 6	13 0	3 0	W 2	cloudy	0,020
	4 p m	29 7	13 8	2 8	W 2	cloudy	
30	9 a m	29 7	14 0	2 1	W 2	fair	——
	5 p m	29 7	14 0	1 7	W 3	fair	
H. at a med.		29 5	13 2	2 3		Total depth	2,057
Gr. height		30 1	16 0	3 7			
L. height		29 1	10 6	1 2			

JULY 1731.

D.	Hour.	Baro. In.	D.	Ther. In.	D.	Hyg. I.	D.	Wind. Dir.	For.	Weather.	Rain. In D.
1	9 a m	29	9	13	7	1	7	W	2	fair	—
6	6 p.m	29	9	13	6	1	7	W by N	1	fair	
2	10 a m	30	0	13	4	2	1	N	1	fair	—
	5 p m	30	0	14	3	1	8	N by E	1	fair	
3	8 a m	30	0	13	9	1	8	N by W	1	fair	—
	8 p m	30	0	15	2	1	4	W	1	fair	
4	9 a m	30	0	14	6	1	6	W by N	1	fair	—
	5 p m	30	0	16	2	1	2	W by N	1	fair	
5	9 a m	29	9	15	2	1	4	W	1	fair	—
	5 p m	29	8	15	6	1	6	N E	1	fair	
6	9 a m	29	8	13	4	2	5	N E	1	fair	—
	8 p m	29	8	13	4	2	4	N E	1	cloudy	
7	9 a m	29	8	13	3	3	0	N E	1	fog	—
	4 p m	29	8	14	5	2	2	E	1	fair	
8	9 a m	29	8	14	3	2	2	N E	1	fair	—
	5 p m	29	9	14	9	2	0	N E	1	fog	
9	9 a m	29	9	14	2	2	1	E	0	fair	0,016
10	9 a m	30	0	14	1	1	8	W	2	fair	—
	4 p m	30	0	15	5	1	5	W	3	fair	
11	9 a m	29	9	13	9	1	6	W	2	fair	—
	5 p m	29	9	14	9	1	4	W	2	fair	
12	8 a m	29	9	13	8	1	8	W	2	fair	—
	8 p m	29	8	14	6	1	3	W	1	fair	
13	9 a m	29	8	14	2	1	8	W	1	rain	0,012
	4 p m	29	7	14	3	1	6	N by E	1	fair	
14	9 a m	29	7	13	6	1	4	N E	0	rain	0,243
	5 p m	29	7	14	5	1	7	N	1	cloudy	
15	8 a m	29	6	13	5	1	9	W	0	rain	0,080
	6 p m	29	6	14	5	1	3	W	1	fair	
16	9 a m	29	6	13	4	1	6	N W	1	cloudy	—
	5 p m	29	7	14	1	1	4	N by E	0	cloudy	
7	9 a m	29	7	13	1	1	4	E by N	1	fair	—
											0,351

JULY 1731.

D	Hour.	Baro. In D.		Ther. In D.		Hyg. I. D.		Wind. Dir. For.		Weather.	Rain.
	5p m	29	7	13	7	1	2	N E	1	cloudy	0,351
18	10 a m	29	8	12	6	1	4	N E	1	fair	0,027
	4 p m	29	9	14	0	1	2	N E	1	fair	
19	9 a m	29	9	13	3	1	5	W by S	1	fair	—
	6 p m	29	8	15	2	1	1	W	1	fair	
20	9 a m	29	7	14	2	1	4	S by W	1	cloudy	—
	5 p m	29	6	14	6	1	3	S	1	rain	
21	9 a m	29	4	14	9	1	8	S by W	1	cloudy	0,243
	5 p m	29	4	15	3	1	3	W by S	1	cloudy	
22	9 a m	29	5	14	1	1	6	W	1	cloudy	0,007
	6 p m	29	5	15	8	1	2	S W	1	fair	
23	9 a m	29	5	14	6	1	8	S	1	rain	0,255
	6 p m	29	5	15	7	1	5	S	0	cloudy	
24	9 a m	29	6	13	7	1	9	W	1	cloudy	—
	5 p m	29	6	15	0	1	2	W	1	fair	
25	9 a m	29	6	14	6	1	7	N	1	cloudy	0,147
	4 p m	29	6	15	0	0	9	N	0	fair	
26	9 a m	29	7	13	4	1	5	W	1	fair	—
	4 p m	29	8	15	0	0	9	W	1	fair	
27	9 a m	29	8	14	2	1	3	S W	0	cloudy	
	5 p m	29	7	15	0	1	8	W	1	cloudy	0,243
28	9 a m	29	7	15	2	1	9	W	1	cloudy	0,010
	7 p m	29	8	15	0	1	4	S	2	cloudy	
29	9 a m	29	8	15	7	1	4	S by W	1	cloudy	—
	5 p m	29	8	15	1	1	1	S by W	1	cloudy	
30	9 a m	29	8	15	5	1	5	S by E	1	cloudy	
	5 p m	29	7	16	0	1	3	E	1	thunder	0,065
31	9 a m	29	7	14	5	1	6	E by N	1	mist	
	5 p m	29	6	14	2	1	5	E	1	thunder	0,193
H. at a med.		29	7	14	2	1	6			Total depth	1,541
Gr. height		30	0	16	2	3	0				
L. height		29	4	12	6	0	9				

AUGUST 1731.

D	Hour.	Baro In.	D.	Ther. In.	D.	Hyg. I.	D.	Wind. Dir.	For.	Weather.	Rain. In D.
1	9 a m	29	6	15	4	2	0	S E	1	cloudy	0,044
	5 p m	29	6	15	5	2	0	S E	1	rain	
2	9 a m	29	5	13	2	3	8	E	1	rain	0,736
	5 p m	29	6	14	8	3	1	E	1	fair	
3	9 a m	29	8	13	8	2	9	E	1	fair	0,003
	3 p m	29	8	14	9	2	6	E	1	fair	
4	9 a m	29	9	13	9	3	1	E	1	cloudy	—
	4 p m	29	9	13	8	2	5	E	1	fair	
5	9 a m	29	9	13	1	2	9	E	1	cloudy	—
	5 p m	29	9	14	0	2	4	E	1	cloudy	
6	9 a m	29	9	13	7	2	6	E	1	fair	—
	4 p m	29	9	14	6	2	1	E	1	fair	
7	8 a m	29	9	14	0	2	6	E	1	cloudy	—
	4 p m	29	9	15	5	2	0	E	1	fair	
8	9 a m	29	9	14	8	2	0	N	1	cloudy	—
	4 p m	29	8	15	7	1	5	N	1	fair	
9	9 a m	29	5	13	8	1	8	N W	2	fair	—
	4 p m	29	4	13	4	1	4	N W	2	fair	
10	9 a m	29	5	12	7	1	3	N	2	cloudy	—
	4 p m	29	7	13	2	1	2	N W	1	fair	
11	9 a m	29	0	11	9	1	2	N W	1	fair	—
	4 p m	29	9	14	1	1	0	N W	1	fair	
12	9 a m	30		13	0	1		N W	1	fair	—
	4 p m	30	1	14	9	1	1	W	1	fair	
13	8 a m	30		12	7	1	4	W	1	fair	—
	4 p m	30	1	14	8	1	0	W by N	2	fair	
14	8 a m	30	1	14	0	1	4	W by N	1	fair	—
	5 p m	30	1	14	8	1	2	N	1	fair	
15	9 a m	30	1	13	5	1	8	N E	1	cloudy	—
	4 p m	30	1	13	7	1	5	E by N	2	cloudy	
16	8 a m	30	1	12	6	1	5	E by N	1	cloudy	—
	4 p m	30	0	12	9	1	9	E by N	1	cloudy	
											0,783

AUGUST 1731.

D.	Hour.	Baro In D.	Ther. In D.	Hyg. D.	Wind, Dir	For.	Weather.	Rain.
								0,783
17	9 a m	30 0	13 4	1 7	N E	1	cloudy	0,008
	5 p m	30 0	13 9	1 1	S by E	1	fair	
18	8 a m	30 0	12 9	2 3	E	1	fair	—
	5 p m	30 0	13 5	1 7	N E	2	fair	
19	9 a m	30 1	13 1	2 0	E	1	cloudy	—
	5 p m	30 1	13 2	1 7	E by N	1	fair	
20	8 a m	30 1	12 4	1 8	E by N	1	cloudy	—
	5 p m	30 0	13 2	1 6	E by N	1	cloudy	
21	8 a m	30 0	12 8	2 0	E by N	1	cloudy	—
	4 p m	29 9	13 0	1 9	E by N	1	cloudy	
22	8 a m	29 8	12 8	1 8	E by N	1	cloudy	—
	4 p m	29 6	12 7	2 2	E by N	2	cloudy	
23	9 a m	29 5	13 1	2 9	E by N	2	cloudy	0,069
	6 p m	29 5	13 2	3 7	N E	1	rain	
24	8 a m	29 4	12 6	3 8	N E	1	cloudy	0,209
	5 p m	29 5	12 8	2 7	N E	1	cloudy	
25	8 a m	29 6	12 2	2 3	E by N	1	cloudy	—
	4 p m	29 6	12 8	1 5	E	1	cloudy	
26	8 a m	29 6	12 0	2 4	E	2	rain	0,164
	5 p m	29 6	11 9	2 6	E	1	rain	
27	9 a m	29 4	12 6	3 8	N by E	1	fair	0,485
	5 p m	29 4	13 5	2 5	N by E	0	fair	
28	9 a m	29 4	12 8	3 5	N by E	1	mist	0,033
	5 p m	29 4	13 8	3 3	N by E	1	fog	
29	9 a m	29 4	13 6	2 8	N by E	0	fog	
	6 p m	29 5	13 5	3 3	N by E	0	fog	
30	8 a m	29	13 3	3 4	N E	0	cloudy	0,083
	5 p m	29 4	13 8	3	E by N	1	mist	
31	8 a m	29 4	13 7	3 9	W	1	cloudy	0,032
	5 p m	29 4	14 6	2 1	S W	1	cloudy	
H. at a med.		29 7	13 5	2 2			Total depth	1,857
Gr. height		30 1	15 7	3 8				
L. height		29 4	11 9	1 [illegible]				

SEPTEMBER 1731.

D.	Hour.	Baro. In.	Baro. D.	Ther. In	Ther. D.	Hyg. I.	Hyg. D.	Wind. Dir.	Wind. For.	Weather.	Rain. In D.
1	9 a m	29	4	13	6	2	3	S W	1	cloudy	0,025
	6 p m	29	4	13	7	2	2	S	0	fair	
2	8 a m	29	3	14	7	2	3	S W	2	rain	
	5 p m	29	2	13	5	2	1	S W	2	variable	
3	8 a m	29	2	12	8	2	2	W by S	2	variable	0,566
	4 p m	29	2	13	9	1	6	W by S	3	fair	
4	9 a m	29	1	13	3	2	0	W by S	3	lowring	0,195
	5 p m	29	1	12	7	1	7	W by S	3	variable	
5	9 a m	29	3	12	0	1	7	W by N	4	fair	
	6 p m	29	5	12	8	1	5	W by N	3	cloudy	
6	9 a m	29	4	13	0	1	7	W	3	clear	0,091
	4 p m	29	4	13	0	1	3	W	3	cloudy	
7	8 a m	29	4	11	7	1	0	W	3	cloudy	—
	5 p m	29	5	13	2	1	2	N W	2	cloudy	
8	9 a m	29	7	11	3	1	3	N W	2	clear	—
	5 p m	29	8	12	4	1	4	N by W	2	variable	
9	8 a m	30	0	10	7	1	4	W	1	fair	—
	4 p m	30	0	12	5	1	2	W	1	cloudy	
10	8 a m	30	0	12	7	1	1	W	2	clear	—
	5 p m	30	0	13	3	1	8	W	1	cloudy	
11	8 a m	30	0	12	4	2	0	W by S	1	clear	—
	4 p m	30	0	13	6	1	3	W	2	clear	
12	9 a m	29	9	13	0	1	7	S W	1	cloudy	0,022
	5 p m	29	8	13	6	1	7	S W	2	variable	
13	8 a m	29	9	13	1	2	0	W	1	fair	—
	5 p m	30	0	14	1	1	4	W	1	fair	
14	8 a m	30	1	13	0	2	0	W	1	fair	
	4 p m	30	2	14	5	1	7	W	1	fair	
15	8 a m	30	1	15	2	1	8	W by N	1	fair	
	6 p m	30	1	14	0	1	8	N W	0	fair	
16	9 a m	30	0	13	0	1	8	S W	0	fair	—
	5 p m	29	9	14	6	1	4	S W	0	clear	
											0,899

SEPTEMBER 1731.

D.	Hour.	Baro. In D.	Ther. In.	D.	Hyg. I.	D.	Wind. Dir.	For.	Weather.	Rain.
										0,899
17	8 a m	29 8	13	6	1	6	S W	2	fair	—
	4 p m	29 8	13	2	1	4	W	3	cloudy	
18	8 a m	29 6	12	5	1	5	S W	3	cloudy	0,003
	5 p m	29 4	12	4	1	5	S W	2	variable	
19	8 a m	29 6	11	9	1	5	W	2	clear	0,150
	4 p m	29 7	12	9		5	W	2	cloudy	
20	8 a m	29 7	13	1		7	S W	2	cloudy	0,054
	5 p m	29 7	13	6	1	5	S W	1	cloudy	
21	8 a m	29 6	13	6	1	6	S by W	2	fair	—
	4 p m	29 5	14	5	1	5	S by W	3	fair	
22	8 a m	29 6	12	2	2	2	W	1	rain	
	5 p m	29 5	12	0	2	4	N E	1	variable	
23	9 a m	29 6	11	2	2	5	W by N	1	rain	0,763
	5 p m	29 7	11	9	2	0	W by N	1	fair	
24	8 a m	29 9	11	2	2	0	N W	1	fair	0,030
	6 p m	29 9	11	7	1	8	N W	1	fair	
25	8 a m	29 8	11	3	1	7	S E	1	fair	—
	5 p m	29 7	12	1	1	7	S E	1	fair	
26	9 a m	29 6	12	8	2	2	S E	1	cloudy	—
	4 p m	29 5	14	0	1	9	S E	1	cloudy	
27	9 a m	29 3	13	0	2	0	S E	1	cloudy	0,045
	5 p m	29 2	13	2	1	8	S	1	variable	
28	9 a m	29 4	12	5	1	8	S by W	1	fair	0,011
	4 p m	29 2	13	0	1	7	S	4	rain	
29	9 a m	29 0	13	0	1	6	W by S	4	stormy	0,155
	5 p m	29	13	1	1	6	W	3	clear	
30	9 a m	29 3	14	3	1	9	S	2	cloudy	0,010
	3 p m	29 3	14	3	1	5	S W	3	cloudy	
H. at a med.		29 6	12	9	1	7			Total depth	2,121
Gr. height		30 2	14	7	2	5				
L. height		29 0	10	7	1	1				

OCTOBER 1731.

D.	Hour.	Baro. In.	D.	Ther. In.	D.	Hyg. I.	D.	Wind. Dir.	For.	Weather.	Rain. In D.
1	9 a m	29	4	12	1	1	8	S W	3	variable	0,085
	5 p m	29	6	12	8	1	8	S W	2	variable	
2	9 a m	29	6	13	6	1	9	S W	3	variable	0,090
	4 p m	29	7	14	3	1	7	S W	3	cloudy	
3	9 a m	29	9	12	2	2	0	W	2	clear	
	4 p m	29	9	13	0	1	5	W	2	clear	
4	9 a m	29	8	12	0	1	4	W	1	rain	0,390
	5 p m	29	8	11	7	1	6	N W	1	variable	
5	9 a m	29	0	10	5	2	5	S W	1	fair	0,007
	4 p m	29	8	11	8	1	8	S W	2	variable	
6	8 a m	29	7	11	7	2	2	W	2	fair	—
	4 p m	29	8	12	1	1	6	W	2	fair	
7	8 a m	29	6	12	4	2	2	S W	3	cloudy	—
	5 p m	29	5	13	1	2	0	W	3	varjable	
8	9 a m	29	7	11	5	1	5	W	3	clear	
	5 p m	29	9	10	7	1	3	N	3	clear	—
9	8 a m	30	0	9	4	1	3	N	2	mist	—
	4 p m	30	0	11	2	1	4	W	1	cloudy	
10	9 a m	29	7	12	6	2	3	W by S	2	cloudy	—
	4 p m	29	6	13	0	2	0	W	2	cloudy	
11	8 a m	29	8	10	0	1	4	N E	2	clear	—
	5 p m	29	9	10	7	1	5	E by N	1	clear	
12	9 a m	30	0	10	6	1	6	S E	2	cloudy	—
	5 p m	30	0	10	5	1	5	S E	2	clear	
13	8 a m	29	8	10	2	1	7	S E	1	fair	—
	4 p m	29	7	11	5	1	5	S E	1	fair	
14	8 a m	29	6	11	6	2	5	S E	1	fair	0,025
	9 p m	29	5	12	2	2	5	——		rain	
15	9 a m	29	5	11	9	2	3	W	1	fair	0,259
	4 p m	29	5	12	4	1	6	W	1	clear	
16	9 a m	29	5	11	2	2	2	S W	1	fair	0,062
	5 p m	29	5		2	1	7	S W	1	rain	
											0,826

OCTOBER 1731.

D.	Hours	Baro. In.	Baro. D.	Ther. In	Ther. D.	Hyg. I.	Hyg. D.	Wind. Dir.	Wind. For.	Weather.	Rain.
											0,826
17	9 a m	29	4	13	7	1	8	S W	3	cloudy	
	4 p m	29	5	13	2	1	8	S W	2	cloudy	
18	8 a m	29	7	12	4	2	0	S W	1	clear	
	4 p m	29	7	13	2	2	0	S	1	cloudy	
19	8 a m	29	6	11	7	1	9	S by E	0	fair	0,062
	5 p m	29	8	11	6	1	6	S	3	fair	
20	9 a m	29	9	10	7	1	9	S by E	1	cloudy	0,045
	4 p m	29	9	11	4	2	0	S by E	1	cloudy	
21	8 a m	29	9	11	4	2	0	S by E	0	cloudy	
	5 p m	29	8	11	4	1	9	S by E	1	cloudy	
22	9 a m	29	8	10	3	1	9	S by W	1	fair	0,009
	4 p m	29	8	11	3	1	8	S by W	1	fair	
23	9 a m	29	6	11	2	1	7	S	1	cloudy	
	4 p m	29	5	12	1	1	8	S	1	rain	
24	9 a m	29	7	10	3	2	0	S	2	clear	
	4 p m	29	7	11	4	1	9	S	1	cloudy	
25	9 a m	29	6	11	5	2	3	S	1	cloudy	
	5 p m	29	5	11	4	2	0	S	1	cloudy	
26	9 a m	29	5	11	5	2	2	S	1	fog	0,085
	4 p m	29	4	12	0	2	1	S E	1	cloudy	
27	9 a m	29	5	11	7	2	4	S W	1	rain	
	4 p m	29	6	11	4	2	7	E	1	rain	
28	9 a m	29	7	12	5	3	7	N E	2	mist	0,246
	4 p m	29	7	12	0	3	4	S E	1	cloudy	
29	9 a m	29	6	12	1	3	1	S E	1	cloudy	0,010
	5 p m	29	5	12	2	3	0	S E	1	cloudy	
30	9 a m	29	3	11	8	2	8	S E	2	cloudy	
	4 p m	28	9	11	9	2	7	S E	3	cloudy	
31	9 a m	28	8	10	5	2	4	S by W	1	rain	0,196
	4 p m	28	8	10	1		3	S W	1	cloudy	
H. at a med.		29	3	11	7	2	0			Total depth	1,479
Gr. height		30	0	14	3	3	4				
L. height		28	8	10	8	1	3				

NOVEMBER 1731.

D.	Hour.	Baro In D	Ther. In D.	Hyg. In. D.	Wind. Dir.	For.	Weather.	Rain. In D.
1	9 a m	28 8	8	7 2	4	S W	1 clear	0,273
	4 p m	28 9	9	3 2	4	S W	1 clear	
2	8 a m	28 9	9	2 2	5	W	2 cloudy	—
	4 p m	29 1	9	0 3	4	W	2 clear	
3	9 a m	29 1	9	5 2	5	W	2 clear	
	4 p m	29 2	10	4 2	4	W	2 cloudy	
4	9 a m	29 2	10	6 2	1	W	2 clear	0,025
	4 p m	29 3	10	5 2	0	W	2 clear	
5	9 a m	29 4	10	0 2	3	W	2 cloudy	0,034
	4 p m	29 3	10	2 2	3	W	2 cloudy	
6	8 a m	29 7	8	5 2	4	W	2 clear	—
	4 p m	29 2	9	0 2	0	N W	2 clear	
7	9 a m	29 3	8	4 2	0	N W	1 clear	—
	4 p m	29 4	8	6 2	0	N W	1 clear	
8	9 a m	29 4	8	6 2	2	N W N	1 mist	—
	3 p m	29 3	9	2 2	2	N E	1 clear	
9	9 a m	29 3	9	9 2	4	E	2 cloudy	0,093
	4 p m	29 3	9	9 2	4	E	2 cloudy	
10	9 a m	29 4	10	1 2	5	N E	3 rain	0,256
	3 p m	29 4	10	1 3	0	N E	3 rain	
11	9 a m	29 6	10	0 3	8	N E	2 cloudy	
	3 p m	29 7	10	2 3	4	N E	2 cloudy	
12	9 a m	29 6	10	2 3	1	S W	2 cloudy	
	4 p m	29 5	10	6 2	6	W	2 cloudy	0,286
13	9 a m	29 7	9	7 2	8	W	1 clear	—
	3 p m	29 7	10	6 2	6	W	1 cloudy	
14	9 a m	29 5	12	3 2	8	W	3 cloudy	—
	4 p m	29 6	12	6 2	9	W	3 cloudy	
15	9 a m	29 8	12	0 3	0	W	3 clear	—
	4 p m	29 9	12	2 2	9	W	1 cloudy	
16	9 a m	30 0	11	1 2	9	W	1 fog	—
	2 p m	29 9	11	8 2	8	W by S	1 cloudy	
								0,965

NOVEMBER 1731.

D.	Hour.	Baro. In.	D.	Ther. In.	D.	Hyg. I.	D.	Wind. Dir.	For.	Weather.	Rain.
											0,965
17	9 a m	29	8	11	5	2	8	S W	1	cloudy	—
	2 p m	29	7	11	8	2	7	S W	1	cloudy	
18	9 a m	29	8	11	6	2	8	W	2	clear	1
	2 p m	29	8	12	0	2	6	W	2	cloudy	
19	9 a m	29	5	10	9	2	5	W	3	cloudy	
	2 p m	29	4	10	6	2	2	W	3	cloudy	
20	8 a m	29	8	9	1	2	0	N W	1	clear	0,021
	2 p m	29	9	9	9	2	0	W	1	cloudy	
21	11 a m	29	9	11	2	2	1	W	2	clear	
	4 p m	29	8	11	1		0	W	2	clear	
22	9 a m	29	6	10	3	2	1	W	3	clear	
	4 p m	29	6	10	3	2	0	W	3	cloudy	
23	9 a m	29	5	8	9	2	3	W	2	clear	0,203
	3 p m	29	5	9	5	2	1	W	3	cloudy	
24	9 a m	29	7	8	4	2	0	N W	2	cloudy	
	3 p m	29	8	8	8	2	0	N W	3	cloudy	
25	9 a m	29	9	7	8	2	0	N W	2	froſt	—
	2 p m	29	9	8	6	1	9	N W	2	fair	
26	9 a m	30	1	7	4	1	9	N W	2	froſt	
	3 p m	30	1	8	3	1	4	N W	2	fair	
27	9 a m	30	3	8	0	1	2	W	1	froſt	
	2 p m	30	3	8	4	2	2	W	1	cloudy	
28	9 a m	30	1	9	2	2	1	S E	1	fair	
	4 p m	30	0	9	2	2	1	E	1	fair	
29	9 a m	29	6	9	2	2	2	E	1	fog	
	2 p m	29	5	9	2	2	3	E by S	1	foggy	
30	9 a m	29	5	9	4	2	0	S W	2	cloudy	
	4 p m	29	5	9	5	2	1	S W	2	cloudy	0,233
H. at a med.		29	8	9	8	2	3			Total depth	1,422
Gr. height		30	3	12	6	3	8				
L. height		28	0	7	4	1	2				

DECEMBER 1731.

D.	Hour.	Baro. In.	D	Ther. In.	D.	Hyg. I.	D.	Wind. Dir.	For.	Weather.	Rain. In D.
1	9 a m	29	8	8	2	2	3	W by S	1	clear	0,075
	2 p m	29	8	9	1	2	0	W by S	1	clear	
2	9 a m	29	9	9	8	2	4	S W	2	cloudy	—
	2 p m	29	9	11	0	2	5	S W	3	cloudy	
3	9 a m	29	6	9	9	2	4	W	3	clear	—
	2 p m	29	6	10	2	2	1	W	3	clear	
4	9 a m	29	5	9	0	2	6	W	2	fog	
	2 p m	29	5	9	9	2	4	W	2	fog	
5	9 a m	29	3	11	7	2	9	W	4	cloudy	
	3 p m	29	2	11	4	2	3	W	4	clear	
6	9 a m	29	4	9	4	2	2	W	2	clear	0,062
	2 p m	29	4	9	7	2	2	W	2	clear	
7	9 a m	28	9	8	9	3	5	N	3	rain	
	2 p m	29	0	8	5	3	4	N	2	fair	
8	9 a m	29	4	7	3	2	3	W	2	froſt	
	2 p m	29	5	7	6	2	3	W	2	froſt	
9	9 a m	29	3	8	3	2	3	S E	3	ſtormy	
	2 p m	29	0	9	4	2	4	S	3	ſtormy	1,175
10	2 p m	29	2	10	2	2	2	W	3	cloudy	—
11	9 a m	29	7	10	6	2	6	S W	2	cloudy	
	2 p m	29	8	11	2	2	5	W	2	clear	
12	9 a m	29	6	10	2	2	1	W	4	lowring	0,173
	3 p m	29	6	9	3	2	2	W	4	cloudy	
13	9 a m	29	4	10	9	2	4	W	3	cloudy	—
	2 p m	29	4	11	4	2	1	W	3	cloudy	
14	9 a m	29	5	9	4	1	7	N W	4	clear	0,081
	2 p m	29	7	9	3	1	8	N W	3	fair	
15	9 a m	29	9	7	8	1	8	S	1	froſt	0,030
	2 p m	29	8	8	8	1	7	S	1	cloudy	
16	9 a m	29	6	9	2	2	4	W	1	clear	0,070
	2 p m	29	6	9	8	2	3	W	1	clear	
17	9 a m	29	3	9	5	2	3	S W	1	cloudy	
											1,666

DECEMBER 1731.

D.	Hour.	Baro. In D.	Ther. In D.	Hyg. I. D.	Wind. Dir. For.	Weather.	Rain.
							1,666
	4 p m	29 2	8 8	2 4	W 1	snow	
18	9 a m	29 4	8 8	2 5	N 3	rain	0,092
	p m	29 3	9 3	2 0	N 2	cloudy	
19	a m	29 8	8 3	2 0	N 2	cloudy	——
	p m	29 8	9 0	2 0	N 2	cloudy	
20	9 a m	29 8	8 5	2 4	N W 1	cloudy	
	2 p m	29 8	8 8	2 1	N W 1	clear	
21	9 a m	30	7 5	2 2	W 1	froſt	0,237
	2 p m	30	8 5	2 3	W 2	clear	
22	9 a m	30 1	8 8	2 9	E 1	fog	
	2 p m	30 2	9 3	2 8	E 2	clear	
23	9 a m	29 9	8 7	2 5	S E 1	fog	
	2 p m	29 9	8 8	2 6	S E 1	clear	
24	8 a m	29 8	8 3	2 8	N 2	cloudy	
	2 p m	29 7	8 4	2 5	N W 2	clear	
25	8 a m	29 9	8 8	2 5	W 2	rain	1,027
	2 p m	29 8	9 2	2 6	N W 2	cloudy	
26	9 a m	29 6	6 7	2 0	W 2	froſt	——
	3 p m	29 5	6 8	2 1	N W 2	snow	
27	9 a m	29 4	6 3	1 9	W 2	clear	
	2 p m	29 4	6 3	1 9	W 2	clear	
28	9 a m	29 5	5 7	2 1	W 2	froſt	0,080
	2 p m	29 5	6 9	2 0	W 2	cloudy	
29	8 a m	29 1	7 6	2 8	W 1	snow	——
	2 p m	29 1	9 2	3 2	W 1	cloudy	
30	9 a m	29 2	10 9	3 0	S W 2	cloudy	
	2 p m	29 3	11 5	2 8	S 3	cloudy	
31	9 a m	29 7	11 3	2 6	S W 1	cloudy	0,023
	2 p m	29 7	11 4	2 3	S W 1	fair	
H. at a med.		29 5	9 0	2 3		Total depth	3,125
Gr. height		30 2	11 7	3 5			
L. height		28 9	5 7	1 7			

JANUARY 1732

D	Hour.	Baro. In.	D.	Ther. In.	D.	Hyg. I.	D.	Wind. Dir.	For.	Weather.	Rain. In D.
1	9 a m	29	8	10	3	1	8	E	1	fair	0,035
	2 p m	29	8	10	5	1	9	S E	2	fair	
2	9 a m	30	0	8	9	2	5	S E	2	fog	
	3 p m	30	0	9	1	2	6	S E	2	fog	
3	9 a m	30	1	8	4	2	5	S E	2	fog	
	3 p m	30	1	8	6	2	4	S E	2	clear	
4	9 a m	30	2	8	6	2	2	S E	1	fog	
	2 p m	30	2	9	0	2	2	S E	1	fog	
5	9 a m	30	2	9	3	3	4	E	2	mist	0,023
	2 p m	30	2	9	1	3	2	N E	2	cloudy	
6	9 a m	30	0	9	3	3	5	N E	2	rain	
	2 p m	29	9	9	4	3	0	N E	2	clear	
7	9 a m	29	6	8	4	2	3	W	2	cloudy	
	2 p m	29	5	8	3	3	0	W	2	snow	
8	9 a m	29	3	7	5	2	3	W	2	froft	
	2 p m	29	3	7	7	2	2	W by N	2	froft	
9	9 a m	29	4	7	2	2	2	W	2	froft	0075
	4 p m	29	4	7	8	2	4	W	2	cloudy	
10	9 a m	29	7	6	8	2	1	W	2	froft	
	2 p m	29	8	7	4	2	0	W	1	froft	
11	9 a m	29	7	7	5	2	4	S E	2	fair	
	2 p m	29	7	8	4	2	5	S E	2	cloudy	
12	9 a m	29	7	8	5	2	9	S E	2	fog	
	2 p m	29	8	9	2	2	8	S E	2	cloudy	
13	9 a m	29	7	8	2	2	8	S by E	2	fog	
	4 p m	29	7	8	2	2	8	S by E	2	fog	
14	9 a m	29	7	6	9	2	8	S	2	froft	0,173
	2 p m	29	7	7	2	2	5	S	2	froft	
15	9 a m	29	5	6	9	3	0	S E	1	froft	
	2 p m	29	5	8	1	3	2	S E	2	fog	
16	9 a m	29	4	7	7	3	2	S E	2	froft	0,083
	4 p m	29	3	8	5	2	5	S E	2	fog	
											0,385

JANUARY 1732.

D.	Hour.	Baro. In D.	Ther. In D	Hyg I. D.	Wind. Dir. For.	Weather.	Rain.
							0,385
17	9 a m	29 0	8 9	2 8	E 2	fog	
	4 p m	29 0	9 1	3 0	E 2	rain	
18	9 a m	29 1	8 7	3 8	N E 3	fog	
	4 p m	29 2	8 6	3 5	N E 3	rain	
19	9 a m	29 4	8 0	2 5	E 2	snow	
	4 p m	29 5	8 4	2 3	E 2	fair	
20	9 a m	29 7	7 0	2 2	W 2	froſt	0,158
	4 p m	29 7	7 6	2 2	W 2	froſt	
21	9 a m	29 8	7 2	2 2	W 2	froſt	
	4 p m	29 7	8 1	2 2	W 2	froſt	
22	9 a m	29 7	9 0	2 8	W 2	freſh	0,035
	4 p m	29 7	9 1	2 6	W 2	freſh	
23	9 a m	29 7	8 7	2 5	W 2	fair	
	4 p m	29 7	9 0	2 5	W 1	fair	
24	9 a m	29 7	8 5	2 6	S 2	fair	0,120
	4 p m	29 6	9 6	2 5	S 2	fair	
25	9 a m	29 4	11 0	2 5	S 3	rain	
	4 p m	29 4	11 4	2 5	S W 3	rain	
26	9 a m	29 3	11 4	2 5	S W 2	cloudy	
	4 p m	29 2	11 5	2 3	S W 3	cloudy	
27	9 a m	29 1	10 2	2 3	S by W 2	fair	
	4 p m	29 1	10 8	2 2	S 2	fair	0,289
28	9 a m	29 0	9 8	2 7	S E 1	rain	
	4 p m	29 0	10 6	2 6	S W 2	fair	0,052
29	9 a m	29 1	9 3	2 5	S E 2	fair	
	4 p m	29 1	10 3	2 4	S E 2	cloudy	
30	9 a m	29 3	9 9	2 8	S W 2	cloudy	
	4 p m	29 4	10 2	2 7	S W 2	cloudy	
31	9 a m	29 5	10 4	2 6	S by W 2	cloudy	0,144
	4 p m	29 5	11 5	2 3	S by W 2	fair	
Hat a med.		29 3	8 8	2 5		Total depth	1,283
Gr. height		30 1	11 5	3 8			
L. height		28 3	6 0	1 8			

FEBRUARY 1732.

D.	Hour.	Baro. In.	D.	Ther. In.	D.	Hyg. I.	D.	Wind. Dir.	For.	Weather.	Rain. In D.
1	9 a m	29	6	11	6	2	5	S W	2	cloudy	0,053
	4 p m	29	7	11	3	1	8	S W	2	cloudy	
2	9 a m	29	7	11	0	2	1	S by W	2	fair	0,027
	2 p m	29	6	11	8	2	1	S by W	3	fair	
3	9 a m	29	6	11	9	2	2	S W	2	fair	0,063
	2 p m	29	6	12	5	2	2	S W	3	fair	
4	9 a m	29	5	12	0	2	3	S W	3	rain	—
	2 p m	29	4	12	4	2	2	S W	3	cloudy	
5	9 a m	29	6	10	1	2	7	E	1	rain	0,205
	4 p m	29	6	9	9	3	0	E	1	cloudy	
6	9 a m	29	6	10	9	2	6	W	2	cloudy	0,110
	4 p m	29	0	11	3	2	5	W	3	cloudy	
7	9 a m	29	0	8	6	2	2	S E	2	snow	0,197
	3 p m	28	8	9	8	2	5	W	3	fair	
8	9 a m	28	7	9	0	2	6	N E	1	fair	
	2 p m	29	0	8	9	2	3	N	2	fair	
9	9 a m	29	4	9	2	2	2	S	3	cloudy	0,262
	3 p m	29	3	10	9	2	4	S W	3	cloudy	
10	9 a m	29	4	9	9	2	3	S W	3	cloudy	0, 40
	4 p m	29	5	10	6	2	0	W	2	fair	
11	9 a m	29	9	9	6	2	3	W	3	cloudy	0,145
	5 p m	29	2	9	7	2	2	W	3	cloudy	
12	9 a m	29	4	9	1	2	2	W	2	clear	
	5 p m	29	6	10	0	1	8	W	2	cloudy	
13	9 a m	30	1	8	9	2	0	S W	1	cloudy	0,088
	5 p m	30	2	10	1	1	8	S by W	2	cloudy	
14	8 a m	29	9	0	7	2	2	S W	3	cloudy	
	2 p m	29	8	12	0	2	0	S W	3	cloudy	
15	9 a m	29	8	10	6	2	6	W	2	clear	0,209
	2 p m	29	8	11	8	2	3	W	2	cloudy	
16	9 a m	29	6	11	6	2	0	W	2	fair	
	2 p m	29	6	11	3	1	8	W	3	fair	

1,761

FEBRUARY 1732.

D	Hour	Baro. In. D	Ther In. D	Hyg. I. D.	Wind. Dr. For.		Weather.	Rain
								1,761
17	8 a m	29 8	9 8	2 4	W	2	fair	
	5 p m	29 9	11 2	2 0	W	3	cloudy	
18								
	2 p m	29 8	12 8	2 1	S W	2	fair	
19	9 a m	29 8	11 0	2 2	S W	1	fair	
20								
	1 p m	29 5	11 7	1 7	S W	3	fair	
21	9 a m	29 1	11 3	1 9	S W	3	cloudy	
	2 p m	29 1	10 8	1 5	S W	3	cloudy	
22	8 a m	29 3	9	2 1	W	2	clear	0,315
	5 p m	29 4	9 4	1 9	W	2	clear	
23								
	2 p m	29 5	9 9	1 7	W	2	clear	
24								
	2 p m	29 6	10 3	1 5	S	2	clear	
25	10 a m	29 3	9 3	1 7	W	3	snow	0,194
	2 p m	29 3	9 4	1 5	W	3	clear	
26	9 a m	29 3	9 4	2 0	S	3	rain	0,062
	3 p m	29 3	12 2	2 2	W	3	cloudy	
27	9 a m	29 5	11 5	1 8	S W	3	cloudy	
	5 p m	29 4	12 0	2 0	S W	4	rain	
28	9 a m	29 6	9 4	2 0	S W	3	clear	0,077
	5 p m	29 7	10 2	1 7	W	2	clear	
29	9 a m	29 8	9 5	1 9	W	2	clear	
	5 p m	29 8	10 7	1 5	W	1	clear	
H. at a med.		29 4	10 4	2 1			Total depth	2,409
Gr. height		30 2	12 8	3 0				
L. height		28 7	8 6	1 5				

MARCH 1732.

D.	Hour.	Baro. In	Baro. D	Ther. In	Ther. D	Hyg. I.	Hyg. D.	Wind. Dir.	Wind. For.	Weather.	Rain. In D.
1	9 a m	29	4	10	8	1	8	S W	4	tempest	0,067
	5 p m	29	4	10	2	2	6	W	3	rain	
2	9 a m	29	3	9	1	2	3	W	3	clear	0,032
	5 p m	29	3	9	3	1	8	W	2	clear	
3	9 a m	29	3	9	1	1	5	N W	4	clear	0,015
	5 p m	30	1	9	4	1	4	N W	2	clear	
4	9 a m	30	1	8	9	1	7	W	2	cloudy	—
	6 p m	29	9	10	9	1	9	W	2	cloudy	
5	9 a m	29	7	11	2	2	4	W	2	cloudy	—
	4 p m	29	6	11	7	2	4	W	2	cloudy	
6	9 a m	29	6	11	0	2	4	W	1	clear	
	4 p m	29	6	10	8	1	6	N W	2	rain	
7	9 a m	29	8	9	8	1	9	N W	1	clear	0,021
	5 p m	30	0	10	6	1	6	E	1	clear	
8	9 a m	29	9	10	0	1	9	E	1	fair	—
	5 p m	29	7	10	5	1	8	W by N	2	fair	
9	9 a m	29	5	10	1	1	8	W by N	2	fair	—
	4 p m	29	4	9	2	1	9	N	2	variable	
10	9 a m	29	4	7	7	1	5	N W	3	snow	
	5 p m	29	4	7	8	1	4	N W	3	clear	
11	9 a m	29	4	7	7	1	4	N W	3	cloudy	0,039
	4 p m	29	4	7	8	1	4	N	2	clear	
12	9 a m	29	4	7	6	1	3	W	2	clear	
	6 p m	29	4	8	8	1	2	S W	2	cloudy	
13	9 a m	29	2	9	4	2	2	W	2	cloudy	
	4 p m	29	3	9	5	1	5	N E	1	clear	
14	9 a m	29	3	9	8	2	7	S W	2	cloudy	0,102
	5 p m	29	2	10	7	1	7	S W	2	cloudy	
15	9 a m	29	2	10	1	2	1	S W	2	fog	
	5 p m	29	3	11	0	1	8	N	1	clear	
16	9 a m	29	6	10	6	2	2	E	1	fog	
	5 p m	29	6	10	5	2	1	E	1	rain	

0,276

MARCH 1732.

D.	Hour.	Baro. In D.		Ther. In D.		Hyg I. D.		Wind. Dir. For.		Weather.	Rain.
											0,276
17	9 a m	29	6	10	4	2	2	E	1	cloudy	0,024
	4 p m	29	7	11	7	2	4	S W	1	cloudy	
18	9 a m	29	6	11	4	2	0	S W	1	rain	0,056
19	9 a m	29	6	12	5	2	3	W	2	cloudy	
	5 p m	29	7	13	4	1	8	W	1	cloudy	
20	9 a m	29	8	12	9	2	0	W	1	clear	
	5 p m	29	8	13	6	1	8	W	1	cloudy	
21	9 a m	29	8	12	3	2	3	W	1	fog	0,015
	3 p m	29	8	13	6	2	0	W	1	cloudy	
22	9 a m	29	9	12	1	2	2	W	2	clear	
	5 p m	29	9	12	6	1	6	W	2	cloudy	
23	9 a m	29	9	12	4	1	7	S W	2	cloudy	
	4 p m	29	9	13	4	1	4	W	2	cloudy	
24	10 a m	29	9	13	0	1	7	W	2	cloudy	0,031
	5 p m	29	9	13	0	1	7	W	2	fair	
25	9 a m	29	9	10	7	1	5	W	3	fair	
	5 p m	29	8	10	5	1	2	N W	3	fair	
26	9 a m	29	7	9	5	1	5	N W	3	cloudy	0,030
	5 p m	29	7	10	1	1	3	N W	3	hail	
27	9 a m	29	6	9	0	1	5	N W	2	fair	0,030
	4 p m	29	6	9	0	1	8	N	1	snow	
28	9 a m	29	6	9	4	1	8	E	1	snow	
	5 p m	29	5	9	7	1	4	E	1	fair	
29	9 a m	29	5	9	4	1	7	E	2	fair	0,138
	5 p m	29	5	9	5	1	4	E	1	fair	
30	9 a m	29	6	9	7	1	5	E	2	cloudy	
	4 p m	29	5	9	7	1	5	E	3	cloudy	
31	9 a m	29	5	9	9	3	0	E	2	rain	0 173
	4 p m	29	5	9	9	3	4	E	2	rain	
Hat a med.		29	6	10	4	1	8			Total depth	0,793
Gr. height		30	1	13	6	3	4				
L. height		29	2	7	6	1	2				

APRIL 1732.

D.	Hour.	Baro. In.	D.	Ther. In.	D.	Hyg. I.	D.	Wind. Dir.	For.	Weather.	Rain. In.	D.
1	9 a m	29	5	9	8	3	4	E	2	fog	0,193	
	5 p m	29	5	9	9	3	3	E	2	fog		
2	9 a m	29	6	10	3	3	4	E	2	fog	0,095	
	5 p m	29	6	10	9	2	4	E	1	fog		
3	9 a m	29	6	10	9	2	7	S E	1	cloudy	0,070	
	5 p m	29	5	12	7	2	0	S	1	cloudy		
4	9 a m	29	3	11	9	2	3	S	1	rain		
	6 p m	29	3	12	4	1	9	S W	2	fair		
5	9 a m	29	4	11	7	1	9	S W	2	fair	0,082	
	5 p m	29	5	13	2	1	6	S W	1	fair		
6	9 a m	29	7	10	6	3	0	E	2	mist		
	5 p m	29	7	10	9	2	9	E	2	mist		
7	9 a m	29	7	10	2	3	6	E	2	mist		
	5 p m	29	7	10	8	3	5	E	2	mist		
8	9 a m	29	7	10	5	3	8	E	2	mist	0,097	
	5 p m	29	7	11	6	2	9	E	2	mist		
9	9 a m	29	8	10	6	3	6	E	2	mist		
	5 p m	29	9	10	8	3	3	E	2	mist		
10	9 a m	30	0	10	4	3	3	E by N	2	hazy		
	6 p m	30	0	11	0	2	5	E	2	hazy		
11	9 a m	29	9	10	5	2	5	N E	3	variable	0,030	
	5 p m	29	8	10	9	2	2	N E	2	fair		
12	9 a m	29	6	10	6	2	5	S W	2	clear		
	5 p m	29	5	11	9	1	8	N E	2	cloudy		
13	9 a m	29	6	9	3	1	6	N W	3	cloudy	0,350	
	7 p m	29	6	9	5	1	5	N W	3	snow		
14	9 a m	29	5	9	11	4		N W	3	cloudy		
	7 p m	29	5	9	6	1	4	N W	3	cloudy		
15	9 a m	29	5	9	9	1	3	N W	3	clear	0,105	
	4 p m	29	5	10	9	1	2	N W	2	cloudy		
16	9 a m	29	5	9	0	1	3	N W	2	clear		
	5 p m	29	6	10	7	1	1	N by W	2	cloudy		
											1,022	

APRIL 1732.

D.	Hour.	Baro. In D.		Ther. In. D		Hyg I. D		Wind. Dir. For.		Weather	Rain.
											1,022
17	9 a m	29	7	10	2	1	3	N by E	2	clear	
	5 p m	29	7	11	3	1	2	N W	1	clear	
18	9 a m	29	7	10	8	1	3	N W	1	clear	0,131
	5 p m	29	7	11	8	1	4	S E	2	cloudy	
19	8 a m	29	7	10	6	1	5	S E	2	rain	
	5 p m	29	7	10	1		9	E	2	rain	
20	9 a m	29	7	10	5	2	4	E	2	cloudy	0,119
	5 p m	29	6	10	8	2	0	E	1	cloudy	
21	9 a m	29	6	11	8	2	7	E	1	fog	0,152
	5 p m	29	6	12	4	2	4	E	1	rain	
22	9 a m	29	5	12	4	2	3	W	1	cloudy	0,209
	6 p m	29	5	12	5	2	2	S W	1	rain	
23	9 a m	29	5	11	4	2	9	S E	1	rain	
	7 p m	29	2	11	8	2	5	S E	1	rain	
24	9 a m	29	1	12	4	2	1	S	1	cloudy	0,568
	5 p m	29	2	13	4	1	6	by W	2	clear	
25	9 a m	29	3	12	7	2	1	S	2	rain	0,154
	4 p m	29	4	13	0	1	8	E	2	rain	
26	9 a m	29	7	10	2	2	3	E	2	clear	0,074
	6 p m	29	7	11	2	1	7	E	2	clear	
27	9 a m	29	8	10	6	1	7	N E	2	clear	—
	5 p m	29	8	12	5	1	4	N E	1	cloudy	
28	9 a m	29	7	12	0	1	6	W	2	cloudy	0,058
	4 p m	29	6	10	0	1	6	N W	2	rain	
29	9 a m	29	6	11	2	2	0	N E	2	cloudy	0,,62
	7 p m	29	6	10	0	2	2	N W	3	hail	
30	9 a m	29	6	9	8	1	5	W by N	3	cloudy	0,357
	5 p m	29	5	10	7	1	6	W by N	3	rain	
Heat a med.		29	5	10	8	2	1			Total depth 3,1	
Gr. height		30	0	13	2	3	8				
L. height		29	1	9	0	1	1				

MAY 1732.

D.	Hour.	Baro In D.	Ther In D.	Hyg. I. D.	Wind. Dir. For.	Weather.	Rain. In D.
1	9 a m	29 5	9 5	2 5	S E	2 cloudy	0,327
	1 p m	29 4	9 1	2 5	N E	2 rain	
2	9 a m	29 5	9 3	1 6	W	2 clear	0,253
	5 p m	29 5	10 7	1 3	W by N	2 clear	
3	9 a m	29 6	9 8	1 4	W by N	2 clear	0,093
	5 p m	29 6	11 6	1 1	W by N	2 clear	
4	9 a m	29 6	10 6	1 5	N W	2 clear	—
	1 p m	29 6	10 8	1 4	N W	2 clear	
5	9 a m	29 6	10 1	1 4	N by E	2 cloudy	
	5 p m	29 6	11 8	1 1	N	2 clear	
6	8 a m	29 8	11 1	1 3	N	2 clear	
	1 p m	29 8	12 0	1 0	N E	2 clear	
7	9 a m	29 9	11 9	1 1	S E	2 clear	
	1 p m	29 8	13 5	1 0	S E	2 clear	
8	8 a m	29 6	11 8	1 6	E	2 cloudy	—
	5 p m	29 5	12 9	1 7	S	2 rain	
9	9 a m	29 6	12 6	1 5	S W	2 cloudy	0,099
	5 p m	29 5	12 8	1 5	S E	2 rain	
10	8 a m	29 4	12 7	1 6	S	2 cloudy	
	8 p m	29 4	12 6	1 5	S	2 rain	
11	9 a m	29 3	12 4	1 5	S W	3 cloudy	0,173
	5 p m	29 3	13 9	1 0	S W	3 clear	
12	8 a m	29 2	12 7	1 5	W	3 clear	0,237
	5 p m	29 3	12 5	1 5	W	3 rain	
13	8 a m	29 5	12 2	1 4	W	2 cloudy	0,192
	1 p m	29 5	12 7	1 5	S	2 rain	
14	9 a m	29 4	13 7	2 0	S W	2 cloudy	0,125
	5 p m	29 4	13 5	1 5	S W	3 cloudy	
15	8 a m	29 5	13 5	1 6	S W	2 cloudy	0,157
	8 p m	29 5	13 4	1 4	S	3 cloudy	
16	8 a m	29 5	13 2	1 4	S W	2 cloudy	
	5 p m	29 7	14 3	1 3	N E	2 cloudy	
							1,658

MAY 1732.

D	Hour.	Baro. In.	Baro. D.	Ther. In.	Ther. D.	Hyg. I.	Hyg. D.	Wind. Dir.	Wind. For.	Weather.	Rain.
											1,658
17	8 a m	29	9	10	0	1	2	E by N	3	rain	0,298
	5 p m	29	9	11	3	0	5	E	2	cloudy	
18	8 a m	29	9	10	9	1	7	N W	2	cloudy	0,064
	4 p m	29	9	11	1	1	5	N W	2	clear	
19	8 a m	29	8	10	5	0	3	N W	2	cloudy	0,313
	4 p m	29	7	11	1	1	3	N W	2	hail	
20	8 a m	29	6	10	5	1	5	N	1	cloudy	0,279
	4 p m	29	7	11	8	1	5	E	1	cloudy	
21	8 a m	29	7	11	5	1	4	S	1	clear	
	4 p m	29	7	13	1	1	4	S E	1	cloudy	
22	9 a m	29	7	12	2	2	2	W	2	rain	0,411
	5 p m	29	7	13	0	2	1	W by N	2	rain	
23	9 a m	29	5	11	9	2	5	E by S	1	cloudy	0,195
	5 p m	29	4	12	8	2	0	E by S	2	cloudy	
24	9 a m	29	4	12	5	2	5	S	2	rain	0,177
	4 p m	29	4	12	9	2	2	E	2	rain	
25	9 a m	29	4	11	9	2	9	E by S	1	cloudy	0,305
	4 p m	29	4	12	6	2	0	E	1	cloudy	
26	8 a m	29	5	11	8	2	5	E	1	cloudy	0,392
	4 p m	29	4	12	8	1	9	E	2	cloudy	
27	9 a m	29	1	12	5	3	0	E	2	cloudy	0,185
	7 p m	29	0	13	7	1	8	S	1	cloudy	
28	8 a m	29	0	13	2	1	9	S	2	cloudy	0,140
	4 p m	29	1	14	0	1	5	S	2	cloudy	
29	8 a m	29	2	13	5	1	7	S	2	clear	0,061
	4 p m	29	3	14	5	1	3	S	2	clear	
30	9 a m	29	5	13	4	1	8	S W	2	rain	0,094
	5 p m	29	5	14	6	1	7	S W	2	cloudy	
31	8 a m	29	5	12	6	2	0	S E	2	cloudy	0,055
	5 p m	29	5	14	6	1	3	W	2	clear	
H. at a med.		29	5	12	2	1	6			Total depth	4,627
Gr. height		29	9	14	6	3	0				
L. height		29	0	9	11	1	0				

IV *An Account of the* DISEASES *that were moſt frequent laſt year in* Edinburgh.

HAVING undertaken to give ſome account yearly of the diſeaſes that ſhall be obſerved moſt frequent in this city and neighbouring places, and of their changes and ſucceſſions, we judged it moſt proper to begin our obſervations at ſome intermediate period betwixt the two grand claſſes of epidemical diſtempers, according to the ſagacious Sydenham, the *vernal* and *autumnal*. Our medical year therefore ſhall commence at the ſummer ſolſtice, when the ſpring diſeaſes are generally worn out, and before the declenſion of the ſun has brought on the product of the autumn.

In the year 1731, in the month of June, many were ſeized with a ſwelling on the face, and ſalivary glands, which was not attended with a fever or redneſs of the ſkin, and was eaſily removed by a gentle purgative or two.

In the ſucceeding months of July and Auguſt, this ſwelling turned more upon the eryſipelas kind, and fell chiefly upon the forehead and eye-lids; the ſkin, however, was not very high coloured, nor the fever violent: This was likewiſe carried off by purging and veſicatories. Near of kin to this were the ophthalmia, tooth-ach, pains in the head, and a ſlight rheumatiſm, all which were very frequent about the ſame time, but none of them were accompanied with ſo acute a fever, or ſuch violent ſymptoms as required large evacuations; for generally once bleeding relieved the patients,

ents, and a few doſes of cathartics completed the cure.

Towards the end of July, ſome agues began to appear; but theſe had nothing ſingular, and yielded eaſily to the uſual treatment.

The cryſtal or baſtard ſmall pox broke out among the children in Auguſt, ſometimes preceded by the feveriſh ſymptoms, but for the moſt part theſe were very gentle, and the eruption eaſy. Some children, when the firſt puſtules were well advanced, or going off, had a ſecond eruption of freſh puſtules, and ſome a third: But ſtill this ſort of ſmall pox was very kindly, and without danger, requiring little more than a cooling regimen or low diet. At the ſame time ſeveral perſons were taken with a gentle cholera which generally wrought itſelf off in two or three days, without great uneaſineſs, or was cured by ſome doſes of rhubarb. To this ſucceeded dyſenteries, which often proved very tedious, though rarely mortal. The moſt ſucceſsful method was to give repeated doſes of the ipecacuanna, purges of rhubarb with calomel, which often had the effect of an emetic and an opiate every evening. Other aſtringent medicines, without theſe gentle revulſions and evacuations, frequently repeated, were not ſo effectual in this diſeaſe, for they generally retarded the cure.

In October, a pleuriſy with its uſual ſymptoms became frequent; but at this time the pain was moſtly external, and increaſed by touching the part, or lying upon the ſide affected. The violence and continuance of the pain, the hardneſs and frequency of the pulſe, required

red plentiful and frequent bleeding; however, the pain was not wholly removed thereby, but afterwards the application of veſicatories, eſpecially on the ſide affected, afforded great relief. This diſeaſe at length degenerated into a pleuritic fever, which laſted moſt part of the Winter and Spring. In this fever the pain was not ſo conſtant or acute as in the pleuriſy, but the breathing was more difficult, and the pulſe more diſorderly, and often low. In the beginning, this diſeaſe was pretty obſtinate, but not ſo mortal as it proved afterwards in the ſpring; of which more hereafter.

In November, a ſlow fever prevailed pretty much in town, but much more in ſome neighbouring villages. It was attended with a violent pain of the head, a ſmall but quick pulſe, ravings and watchfulneſs; ſeveral in an advanced age died of it; but, of the younger ſort, many paſſed worms by ſtool and recovered. This fever abated ſomewhat in January, but in the next month it became more frequent and hazardous than before; the head-ach was more violent, the ravings more conſtant, and the watchfulneſs more obſtinate; to theſe bad ſymptoms were added tremulous motions, and ſtartings of the tendons, and ſometimes ſymptomatic bleedings at the noſe without relief: In moſt patients the pulſe was little, and frequently in ſome not much changed from the natural; and in others, the arteries ſeemed full but contracted weakly; the urine was generally pale, and without ſediment. Theſe fevers, when allowed their courſe ſome days without interruption, were moſt obſtinate to remedies, and

carried off several vigorous young men; but, in the first days, bleeding and vomiting, and afterwards blistering, did good service, and prevented or abated some of the worst symptoms.

In the interval of this fever, that is, in December and January, there was another frequent among the common people, which always began with a diarrhœa; if this was neglected in the beginning, it never failed to sink the pulse, and to bring on a delirium and watchings, which could not be removed by blistering, diaphoretic or opiate medicines, but continued obstinate till the tenth or twelfth day, when these patients died: But, when they were early bled and vomited, then opiates had remarkable success, and the patients were well on the fifth or sixth day. At the same time other people had a diarrhœa, without any fever; but this was easily carried off by the common method of vomiting and purging.

A quinsy likewise was pretty frequent at this time; it was in most people inflammatory, and attended with a sharp fever, and was cured by plentiful bleeding in the beginning, and blistering; sometimes also it went off by natural and plentiful sweating after letting blood.

The pleurisy formerly mentioned began in March to rage with greater violence than before, and continued through the two following months. The inflammation seemed to have its seat for most part in the muscles; for the patients, during the whole disease, could never bear to lie on the affected side; but a thick, difficult, and painful breathing, a heat and oppression in the breast from the beginning, gave good rea-

son

ſon to ſuſpect, that a peripneumony was joined to it. Perhaps alſo in ſome caſes the oeſophagus or ſtomach was ſlightly inflamed; for many who laboured under this diſeaſe had a frequent and ſtrong reaching to vomit, and even bore the operation of a gentle emetic more eaſily than theſe throws. The pulſe was generally quick and low, but very changeable, and ſometimes intermitting; the urine in ſmall quantity, and of a pale colour; the thirſt great, and the tongue foul and parched. Upon the firſt bleeding, the pain was ſomewhat allayed, the pulſe grew fuller and ſtronger, and the breathing eaſier; but the return of the former complaints ſoon required a ſecond, and then a third bleeding, which, however, often ſunk the pulſe ſo much, that it was difficult afterwards to raiſe it to a moderate ſtrength, unleſs veſicatories were inſtantly applied, which frequently were of great uſe, and ſometimes brought on a ſweat. If this was free and plentiful, it carried off the diſeaſe, but, if partial and ſhort, the patients ſtruggled on with pain, inquietude, and agony, till their ſtrength was quite ſpent.

About this ſeaſon children were attacked with ſeveral diſeaſes, but none of them proved dangerous. Coughs were very univerſal among children, eſpecially when the eaſt wind blew, or upon the fall of ſnow; and indeed, through all this winter and ſpring, perſons of all ages have been more ſubject to coughs than uſual. The kink-cough (*tuſſis convulſiva*) likewiſe, that had been violent among the children at ſome diſtance from town, ſince the beginning of the year, now advanced to the ſuburbs, but was very

little felt within the city, as it happens at moſt other times, however frequent it may be in the country about. Many children at this time got a ſwelling on the face, neither œdematous, nor very inflammatory, and therefore may be called *eryſipelas oedematodes*. Beſides children, others likewiſe had this ſwelling, which often ſpread itſelf over the head, and ſometimes ſeized the arms and lower extremities, where it created a painful itching. Emollient fomentations gave eaſe; and the ſwelling was carried off by gentle purging. About the end of March a ſhort but ſmart fever ſeized ſeveral children, without any topical inflammation: This needed no other cure than a cooling ptiſan, or, at moſt, once bleeding. Some grown perſons at this time felt attacks of the rheumatiſm and *lumbago rheumatica*, which were eaſed by bleeding, bliſtering, and warm applications.

In the following months, April and May, ſcarce any new diſeaſe appeared, but the remains of thoſe already mentioned were ſtill to be found, *viz.* The pleuriſy, the ſlow fever, with a head ach, and ſome with a diarrhœa, the *eryſipelas oedematodes*, the common cough, kink-cough, and ophthalmia; only tertian agues were now epidemic.

V. *An Extract from the public Register of Burials in* Edinburgh.

1731.	Men.	Women.	Child.	Still-born	Sum.
June -	17	27	35	5	84
July - -	19	32	33	5	89
August -	26	26	27	2	81
September	1	30	38	3	88
October	12	19	23	1	55
November	20	27	38	1	86
December	28	23	40	3	94
1732.					
January	36	26	25	3	90
February	35	32	38	3	108
March -	23	31	46	4	104
April -	29	26	58	3	116
May - -	34	34	51	5	124
Total	296	333	452	38	1119

N. B. The above extract is only taken from the records of the City and Cannongate; the numerous suburbs being of design omitted, because of the danger of confounding their burials with those of the country (landward) part of the parishes to which they belong, which there is not sufficient care taken to distinguish in the registers. And, for the same reason, these suburbs are very slightly mentioned in the description of Edinburgh; and no regard is had to them in the calcul of the number of the inhabitants of this city.

VI. *An*

VI *An alterative Mercurial Medicine, by* ANDREW PLUMMER, M. D. *Fellow of the College of Physicians, and Professor of Medicine in the University of* Edinburgh.

ALTHOUGH I am fully satisfied that it is impossible, with any certainty, to attain to the knowledge of the virtue or effects of a new and unknown medicine upon the human body, by reasoning *à priori*; yet I cannot think it inconsistent with this principle to affirm, That certain conclusions, or at least very probable conjectures, may be deduced from the known operations of some medicines, concerning the virtues and effects of others, though untried, when prepared and compounded of such whose powers we have already learned by repeated experiences and constant observations; especially if we are sufficiently informed by chemical experiments of the effects of the bodies employed in the preparation, when applied to one another, and treated in a certain manner. Upon this foot alone it is, that any new production of chemistry can first be introduced into practice among physicians; and this way of reasoning first induced me to make trial of a medicine compounded of *sulphur auratum antimonii* and *calomelas*, with some reasonable hopes of success, in some cases which I am to relate, after I have said somewhat of the medicine itself, its preparation and use.

After that some simple preparations of antimony and mercury had recommended themselves to the observation of physicians, by their great-

great and surprising effects in many obstinate distempers, the chemists every where employed all their art to change these two Herculean medicines into various shapes; but, as many of their preparations were found too rough and untractable, they sett to work again to refine, subtilize, tame, and correct them, by repeated operations, and the addition of various bodies: But their utmost skill was employed, and their greatest hopes were built, upon the uniting and incorporating antimony and mercury together, separating what they imagined the most noxious or useless parts of these bodies, and combining their most active principles. To these labours of the chemists we owe the *butyrum* and *cinnabaris antimonii*, *mercurius vitæ*, *bezoardicum minerale*, *bezoardicum solare*, *lunare*, *joviale*, several panacæas, and many other preparations, on which the inventors have bestowed the most exorbitant encomiums; but I am afraid the too officious care of the chemists has rendered many of these preparations altogether unactive, while others remain incorrigible, and unfit for what they were intended.

The medicine which I here offer to consideration, after I have had some experience of its effects, does not come recommended by a pompous title, or by a tedious and perplexed process; but I hope its simplicity will not prejudise any ingenious person against it: The *sulphur auratum antimonii* and *calomeles*, of which this medicine is compounded, are so well known to every body employed in physic, that I need not here mention their preparations or uses; only I must take notice, that I prefer Angelus Sala's

la's method of preparing the *sulphur antimonii* to that which is directed in moſt pharmacopoeias and courſes of chemiſtry. Sala * proceeds in this manner: Reduce antimony to a groſs powder, or rather break it into ſmall pieces like grains of barley; ſeparate the finer duſt by a ſearce, and put the ſmall pieces into a flat-bottomed glaſs, pouring in *aqua regia* till it riſes a finger's breadth above the antimony; let the ſolution go on without heat, and when there appears a ſulphurous or pitchy matter ſwimming on the liquor, and the antimony is covered with a yellowiſh cruſt, gently pour the *aq. reg.* into another veſſel, keeping back the ſulphurous matter, and waſh the remaining antimony ſeveral times with freſh water, till it acquires no acidity; then pour upon the *antimony ol. tart. p. d.* to the height of two fingers; place the veſſel in warm ſand, and increaſe the fire till the liquor boils; pour out this tincture, and add new *ol. tart.* proceeding as before: To theſe tinctures or ſolutions while warm, add diſtilled vinegar till the effervescence ceaſes; place the veſſel again on warm ſand, and a powder will fall to the bottom, which ſeparate by a filtre, and dry upon brown paper. This ſulphur, or rather *lac ſulphuris antimonii*, Tachenius † imagines is the ſame that Helmoc ‡ hints at in ſome obſcure expreſſions, where he ſays, The true ſulphur of antimony very much reſembles common ſulphur, only its colour has more of a greeniſh caſt; with this ſul-

* Anat. Antim. Part. 2. § 1, cap. 2.
† Hipp. Chem. p. 198.
‡ In verb. Herb. &c. p. 354.

ſulphur he prepares a cinnabar, which, when ſix times ſublimed and infuſed in wine, produces moſt ſurpriſing effects: And this cinnabar ſeems to be the ſame with the *mercurius diaphoreticus* which he mentions in the ſame treatiſe. Tachenius alſo affirms, that he found by experience this ſulphur to be an admirable remedy in the tympany: Of the ſame he prepares a liniment, with two ſimples not named, which rubbed upon the ſpine, wriſts, and ſoles of the feet, infallibly cures tertian agues. Sala likewiſe reckons this ſulphur a powerful aperient, diſcutient, and ſudorific.

I ſaid before, that I preferred the *ſulphur antimonii* prepared in the manner now deſcribed, to the *ſulphur auratum* of the ſhops; not only upon the authorities juſt mentioned, but alſo, becauſe in the common preparation, while the antimony deflagrates with nitre and tartar, much of the true ſulphur is conſumed, and the powder, which is precipitated from the ſolution of the ſcoriæ, conſiſts of many of the groſs earthy parts of the ſalts and antimony: But I muſt own at the ſame time, that I have not ſufficient experience of Helmont's ſulphur, for what I have hitherto uſed in the compoſition of the medicine of which I am treating, was prepared in the common way.

As for the proportions of the *ſulphur auratum* and calomel when I firſt uſed this medicine, knowing that my patient was apt to ſalivate with a ſmall quantity of *mercurius dulcis*, I uſed *ſulph. aurat. antimon. p.* iii. *calomel. p.* ii. but afterwards I took equal parts of both, and increaſed or diminiſhed the doſe as I thought pro-

proper. In the compoſition, I think it is not ſufficient ſimply to mix prepared calomel with the *ſulphur auratum*; but, in my opinion, it is better to unite them more intimately, by breaking the calomel to a coarſe powder, and adding by degrees the *ſulph. aurat.* to levigate them well upon a marble, by which the bright red colour of the *ſulph. aurat.* is changed to a duſky brown. I have always uſed calomel in this preparation, that is, *mercurius dulcis* ſix times ſublimed (beſides the ſublimation of the *corroſive mercury* with quick ſilver), as more mild, and leſs apt to ſtimulate the guts or diſpoſe the humours to a ſalivation. What concerns the doſe, regimen to be obſerved, and effects of this medicine, may be eaſily gathered from the following hiſtory.

Some years ago, a lady about thirty, of a ſlender make and fine ſkin, being troubled with a *porrigo capitis* with hard and dry cruſts, eſpecially on the temples, aſked my advice for removing the diſtemper. After ſeveral doſes of purgative medicines with calomel, repeated at proper intervals, I put her upon a courſe of antiſcorbutic medicines, and preſcribed ſome applications, as lotions and liniments, to the parts: By the uſe of theſe, for ſome weeks, part of the ſcurf began to ſeparate; but my patient too ſoon leaving off the uſe of the medicines, the diſeaſe increaſed apace. When I was called again, about four months from the firſt time, I found the ſcabby cruſts had ſpread themſelves all over the ſcalp, and reached down the forehead to the eye-brows and noſe, and along the ſides of the face to the ears. Upon the

the head, these crusts were not every where continued, but in large, thick and hard spots, adhering very firmly to the skin; when rubbed or scratched, they threw off branny scales, but never ouzed out any matter. Upon the face, the scurf was thin and white, the skin under it was thicker, and the interstices of the scales appeared redder than usual. There were no scaly spots on other parts of the skin, nor any complaints of sickness or pain, only an itching of the parts affected: The disease at this time had the appearance of the psora or beginning lepra. In this case I judged it necessary to put my patient under a course of mercury; and indeed a small quantity of *mercurius dulcis* in a few days raised a salivation which seemed to me sufficient, and small doses of the same, repeated every second or third day for some time, kept it up at the rate of near three English pints *per diem* for the space of four weeks. Upon the declining of the flux, I ordered her head to be fomented twice a day with a decoction of some of the more fixed kind of anti-scorbutic plants, in which soap was dissolved, and the *unguentum antipsoricum cum sulphure* to be rubbed upon it. By this method and the use of the flesh-brush the crusts fell quickly off; and, after the patient's head had been shaved once or twice, the skin appeared perfectly clean and sound, and the hair began to grow as thick and strong as before. Thus the disease seemed to be entirely carried off in the beginning of winter; but, very early in the spring, the scurf began to appear again upon the temples, and very soon to spread itself over the head and towards

wards the face. This quick return of the diſtemper after a ſalivation, and ſome circumſtances in the lady's ſituation at that time, made me bethink myſelf of ſome other method of cure. After caſting my thoughts upon ſeveral things, eſpecially among the antimonial and mercurial medicines, I determined to make a trial of the *ſulphur auratum antimonii*; but not having any experience myſelf of the effects of this medicine, and ſuſpecting its operation might be chiefly on the ſtomach, I thought its emetic quality might be corrected, partly by making the doſe leſs than is preſcribed by authors, and partly by adding to it a ſmall quantity of calomelas, which would either determine its operation downwards, or give it a chance to paſs into the blood and penetrate the ſmall canals, without exciting a ſalivation: But, that I might have ſome knowledge of the effects of this medicine before I preſcribed it to my patient, I reſolved to try a doſe or two of it upon myſelf; I took therefore *ſulph. aurat. antimonii. p.* iii. *calomel. p.* ii. and prepared them as above deſcribed: In a morning faſting, I ſwallowed down 5 grains of this powder with a little conſerve of roſes; this doſe did not affect me in any ſenſible manner; next morning I took 7½ grains of the ſame, which did not affect me more than the firſt; therefore, on the third day, I made the doſe 10 grains, which indeed gave me a ſqueamiſhneſs and puking for ſome hours till breakfaſt, and that day I had a ſtool more than uſual. By theſe trials I was enabled to make a better judgment of the doſe and operation of the medicine I intended to preſcribe;

ſcribe: I ordered therefore a quantity of this powder to be made into pills with the *extractum gentianæ*, adding ſome drops of the *ol. caryophyl.* and I divided the maſs ſo, that 6 pills ſhould contain 15 grains of the powder; of theſe the patient was to take 3 in the morning and 3 at night, with a draught of a weak decoction of the *lignum & cortex guaiaci* moderately warm, which ſhe was alſo to uſe for ordinary drink; the fomentation and ointment formerly mentioned were renewed, only in place of diſſolving ſoap in the fomentation, I cauſed *ſulphuris flavi contuſi unc. ſem. ſal. tart. drach.* ℈i. to be boiled in 2 pounds of the decoction.

As my patient at this time was at ſuch a diſtance from the town that I could not viſit her daily, I gave particular directions in caſe any accident ſhould happen; and, as often as I had opportunity, inquired carefully into the effects of the medicine and progreſs of the cure. I found the pills gave her no uneaſineſs, and had no tendency to vomit or purge; and though, as I obſerved before, ſhe was very eaſily moved to a ſalivation by mercury, yet this medicine did not affect her mouth; only about ten days after ſhe began to uſe the pills, going abroad in a clear froſty day, when a pretty ſharp wind blew, ſhe got a ſlight ſwelling on her face and a clear thin ſpitting; however by the warmth of her chamber and bed, having taken the pills as uſual, the ſwelling and ſpitting were gone by next morning, having ſweated more plentifully than uſual that night; for while ſhe uſed this medicine ſhe generally found a gentle

moiſture on her ſkin towards the morning. In the mean time the cruſts were falling off apace, inſomuch that, in the ſpace of four weeks, or thereby, they were intirely removed, and the lady has now continued near two years without any appearance of the return of the diſeaſe.

I had another inſtance of the good effects of the ſame medicine in another cutaneous diſeaſe.

A perſon, aged about twenty four, had a conſiderable foulneſs of the face from many large red ſpots and pimples; as this eruption happened ſuddenly upon taking cold, blooding, bliſtering, frequent purges, and a long uſe of tincture of antimony were tried in the beginning, but with little advantage: Afterwards antiſcorbutic juices, gum pills with ſoap, medicated whey and goat-whey were uſed for a conſiderable time with no better ſucceſs; at length even a ſix weeks ſalivation failed of removing theſe obſtinate blemiſhes. After ſo many unſucceſsful attempts, I at laſt made a trial of the powder deſcribed in the preceding caſe, of which likewiſe this patient took 15 grains a-day at twice, and drank plentifully of new-made whey through the day. In the ſpace of two months (in which too there were ſome interruptions) the face turned ſmooth and the complexion clear by the uſe of this medicine, with the aſſiſtance only of a gently drying and detergent lotion towards the end. This patient alſo bore the medicine eaſily without ſqueamiſhneſs or grippings.

Though I have never depended upon this medicine

medicine for the cure of the venereal diſeaſe from the beginning, yet I have found it in ſome inſtances very ſerviceable in preventing this infection from ſpreading where I had cauſe to ſuſpect it was not entirely rooted out by preceding medicines, and in carrying off the dregs of this diſtemper; for many patients in theſe caſes too ſoon weary of a cloſe confinement, and frequently break off a courſe before their phyſicians are ſatisfied of their being ſafe from the infection.

A gentleman, who had been unſkilfully treated in a gonorrhœa, and had the running too quickly dried up, ſeveral months after, finding himſelf attacked with worſe ſymptoms of the diſeaſe, without having reaſon to ſuſpect a new infection, aſked my advice: At this time he had a large bubo on each groin, and a chancre on the prepuce, which being naturally large and ſomewhat ſtrait, was a little inflamed, and ſwelled, and threatened a phymoſis; after general evacuations and topics to diſcuſs the ſwelling on the prepuce, I judged it neceſſary to raiſe a ſalivation by *mercurius dulcis*, which, with proper applications, carried off the chancre; but, ſeeing no appearance of the bubo's diſcuſſing, ſuppuratives were applied; and, at length, by eſcharotics we endeavoured to extirpate them: But, before this was entirely completed, the patient being neceſſarily obliged to go about preſſing buſineſs, and ſoon to make a journey into the country, ſuffered the parts to cicatrize ſooner than we intended; however, to prevent as much as poſſible any bad effects from the cure not being finiſhed to my ſatisfaction, I preſcribed

bed the medicine of which I am here treating in the following manner.

℞ *Sulph. aurat Antimon. Calomel non pp. a. drach.* ii. *Calomelas in craſſum pulverem redactum lævigetur ſuper marmor, per vices addendo ſulph. antimonii portionem, & diuturno tritu fiat pulvis ſubtilis. Dein,*

℞ *Pulver. præcedent. unc. ſem. gum. guaiac. drach.* iii. *Reſin. guaiac. drach.* i. *Balſam. capyvi q. s. ut fiat maſſa pilularis, ex cujus ſingulis drachmis formentur pilulæ* xii.

I directed my patient to take three of theſe pills every morning, and as many at night, with a draught of the decoction of the woods, and to drink of it likewiſe at other times. In the courſe of ſome weeks the remains of the bubos were quite gone; although, as my patient afterwards owned to me, it was not poſſible for him in the country to ſhun ſome little irregularities, or to uſe the decoction, but inſtead of it he uſually drank whey.

A perſon who had a virulent gonorrhœa and a ſmall bubo on one ſide became my patient: After the uſual directions about diet, drink, *&c.* and the uſe of a penetrating fomentation, I began with ſome doſes of *mercurius dulcis*, which was purged off by a doſe or two of the *pilulæ coccíæ*; thus alternately the doſes of mercury and purgatives were repeated three or four times; in the intervals, coolers, balſamics, detergents, were uſed according to circumſtances and ſymptoms: By theſe the quantity of the matter was leſſened, and its colour and conſiſtence changed to the better; but ſtill there remained ſome running, and the bubo, though

though ſmall at firſt, was not much diminiſhed; therefore I ordered the pills deſcribed in the preceeding caſe, and a decoction of the woods, which, in twenty days, or thereby, anſwered my expectations and completed the cure. This patient keeping pretty cloſe at home, and living on a ſpare cooling diet during the uſe of the pills and the decoction, ſweated plentifully.

To a perſon troubled with a gleet, which indeed was not very conſiderable of itſelf, but had laſted five or ſix months after the cure of a gonorrhœa, I gave the ſame pills in the ſame doſe as before, by which, and the uſe of Briſtol water, the gleet was carried off in a fortnight. This patient did not ſweet univerſally, but found a more than ordinary moiſture about the inguina and pubis, which ſmelled ſomewhat ranker than uſual.

Theſe are the principal trials I have hitherto made of this medicine, from which I may be allowed to conclude, That it is not only free from the rougher effects of many mercurial and antimonial preparations, but likewiſe effectual in removing obſtructions formed in ſome of the remoteſt and narroweſt canals of the body; and in carrying off the recrements of ſome obſtinate diſtempers, by promoting inſenſible perſpiration or ſweat, provided it be prudently managed and aſſiſted by a proper regimen, and other medicines adapted to the circumſtances of the patient and diſeaſe. But I do not incline to venture too far in aſſigning the immediate effects of this medicine upon the ſolids or fluids of the body, or in determining in what other diſeaſes it may be uſeful.

I have not the vanity, gentlemen, to imagine that the medicine which I have communicated to you deserves to be called a discovery, or that the cases which I have related are, of themselves, worthy to be recorded in your collection: Other physicians, I doubt not, have used *sulphur auratum antimonii*, as an alterative or diaphoretic, and calomel is frequently given in small doses with much the same intention, which might probably have led others in their practice to join these medicines before me; but, as I do not remember to have met with any instances of it, I thought it not inconsistent with your scheme to lay before you the effects which I have observed from the use of this medicine, being persuaded, for my own part, that it is of some importance to physicians to have the true and genuine effects of any medicine, however simple and common it may be, confirmed by certain experiments; and that observations of this kind may be as useful as those which relate only the *prodigia naturæ*.

VII. *An Account of the Virtues and Use of the mineral Waters near Moffat; by Mr* GEORGE MILLIGEN, *Surgeon at Moffat.*

THE mineral waters, commonly known by the name of Moffat-waters, arise from two springs or wells separated from one another by a small rock, which lie at the distance of a long mile northwards from the village of Moffat in Annandale, and 36 miles S. W. from Edinburgh. These springs are situated on the declivity of a hill, and on the brow of a precipice,

pice, with many high mountains at some distance, and almost on every side of them; for though the hill, on whose side they are situated, is small, and of an easy ascent, yet it is the second from the plain of a range of hills that rise gradually above one another, and run North towards their summit called Heartfield, one of the highest hills in Scotland: The soil on every side of the wells is thin, and the hills rocky, only just below the wells there is a small moss, caused by the falling of water from the hill above it.

There is a large vein two or three foot thick, of a flinty rock, like what the miners call spar, which runs in one direction for several miles, forms the bottom and lower sides of the wells, crosses obliquely the rivulet at the bottom of the precipice, and ascends the hill on the opposite side. The stones dug out of this vein are a white and grayish spar, having polished and shining surfaces of regular figures, interspersed with many glittering particles of a golden colour, which are very copious and large in some places, especially about the bottom of the wells. Several small veins of the same nature are apparent in the precipices on each side of the rivulet, and several small gushes of water of the mineral kind proceed from them. The rocks and stones about the top of the wells, and in other parts of the hill and precipice, differ not from common stones. no more than the waters of some small springs, in the neighbourhood, do from common water.

There are two medicinal springs, as I have said, very near one another; the higher well lies

lies with its mouth S. E. It is of an irregular ſquare figure, and is about a foot and a half deep. The lower well is ſurrounded with naked rocks; it forms a ſmall arch of a circle. Its depth is four foot and a half, and the mouth of it faces the Eaſt. By a moderate computation, the two ſprings yield 40 loads of water in 24 hours, each load containing 64 or 68 Scots pints. The water of the higher well is, for the moſt part, uſed for bathing, having a more ſulphurous and foetid ſmell than the other; and, by reaſon of its ſhallowneſs, and the looſeneſs of the earth about it, it is not ſo capable of being kept clean and proper for drinking as the lower well; but as this diſcharges more than ſufficient for that uſe, it alſo ſuplies a great part of the bathing water.

I have no words fully expreſſive of the taſte of theſe waters; moſt people who drink them reſemble it to ſomething ſulphureous, as gunpowder, the ſcourings of a foul gun, a weak ſolution of *ſal polychreſtum*, or *hepar ſulphuris*. Some expreſs it by the taſte of a rotten egg; but none of theſe juſtly come up to the genuine taſte of the mineral water. The ſmell of it indeed nearly reſembles that of a foul gun newly diſcharged. The colour of the water is ſomewhat milky or blewiſh, and that of the upper well is moſt ſo.

There are a great many legendary ſtories that paſs current with the common people in theſe parts, about the firſt diſcovery of the medicinal virtue of Moffat-wells. What is moſt generally believed, is, That theſe waters were obſerved to be endued with ſome remarkable properties,

perties, as impregnated with some mineral, by a daughter of Bishop Whiteford, who was married to a gentleman of this county, and lived within two miles of the wells. This lady, it is said, had been, for the recovery of her health, at some spaws in England or abroad, and finding some resemblance between these waters in her neighbourhood and those she had used elsewhere, made trial of them, first by drinking, and afterwards by bathing in them; and finding advantage by both, she recommended the use of them to others. Whether she was the first that had experienced their medicinal virtue, I shall not determine; but we have good reason to believe she was among the first, in as much as she employed workmen to clear the ground about the springs, (their overflowing having made a small morass), gave encouragement to the poor and advice to others, to make use of a medicine which nature had so bounteously offered to them. This lady was married in the year 1633, or the year following; and it is probable she was a virgin when she was at the English or foreign spaws above mentioned; because her grandchildren knew nothing of her having recourse to any after her marriage; so that it may not be many years under a hundred since these waters were first used medicinally. Indeed the old people here carry the use of the wells in a medical way much higher; but, as there is no certainty for their traditions, I shall pass them over. Certain it is, that these wells have had a considerable reputation beyond the memory of any now living.

The proper season for using these waters is between

between the middle of April and the latter end of September: But ſome, whoſe diſeaſes are more obſtinate, continue to uſe them during the whole winter; for even then, if the weather is fair, or the rains but moderate, the water is little or nothing inferior to its ſtrength in the middle of ſummer.

The method of uſing the water externally, is either by bathing the whole body, or ſome particular diſeaſed part. The ordinary practice of bathing the whole body, is twice, or at the moſt thrice a week, in the evening, when the dinner may be ſuppoſed to be digeſted. The time of continuing in the bath, is from a quarter of an hour, to a whole hour, or more, according to the age, ſex, or conſtitution of the perſon diſordered. The beſt way is to begin with a few minutes, and gradually to increaſe the time of continuance in the bath, as the patient finds it to agree with him. The water uſed in bathing is not now made much warmer than tepid; and the patients, when they come out of it, rub and dry their ſkins, and immediately put on their cloaths, without encouraging ſweating: Whereas not many years ſince, the baths were made as hot as one could bear them; and the patients, after coming out of the water, ſweated for a full hour in bed, wrapt up in flannel or blankets. I ſhall not ſay but this method may in ſome caſes be very proper; but, in my opinion, the practice now in uſe is the more rational, and is, in ſome meaſure, warranted by its ſucceſs in moſt caſes.

The bathing of the whole body is found not to be convenient in inflammations of the face or eyes,

eyes; and therefore moſt people omit bathing while theſe inflammations continue; yet I have known ſeveral bathe their body, even during the inflammation, without receiving any prejudice. I am however perſuaded that it is better at ſuch times to uſe only half baths, or to bathe no more than the legs. I cannot call to mind any other diſtemper for which this well is proper, that interferes with bathing; but a great many come to this place, with whom bathing does not agree, on account of their weakneſs, the unſoundneſs of their viſcera, eſpecially their lungs, or ſome particularity of conſtitution.

It is common with ſuch as have ulcers or tumors, to put the part affected into a convenient veſſel of warm water, and keep it there for the ſpace of half an hour or thereby, from time to time waſhing the ulcer, or gently rubbing the tumor. This is their daily practice morning and evening; through the reſt of the day they dip linen-rags in the water, and keep them by way of compreſſes, on the ulcer or tumor, moiſtening them, as they dry, with the water, which they uſe either hot or cold. When the ulcer or tumor is ſo ſituate, that it cannot be put into the water, they uſe it by way of fotus morning and evening, and apply wet linen-rags, as I hinted before. They have another way of uſing the water externally, eſpecially when the lips of the ulcer are hard and ſwollen, they pour the water when it boils into a proper veſſel, and place the part affected over it, covering both the veſſel and the limb with a piece of thick flannel, to keep in the ſteam. In hard tumors, and where the ſinews are con-

tracted, many let the water fall from on high upon the part affected.

The water is commonly drank in the morning between the hours of six and eleven; some both begin and end later: They that allow most time, and drink gradually, take the best method. None is drank after dinner. This water is constantly every day drank by most patients, especially such as stay only three, four, or six weeks. I am however of opinion, even such would reap more benefit, if they sometimes intermitted a day; much more ought some days to be intermitted by those who stay three, four, or six months, and sometimes years.

It is not easy to ascertain the quantity of water commonly drank, people taking more or less as they think it agrees with them; but most people are apt to exceed in the quantity, especially the poorer sort, who frequently drink in one morning three, four, or five Scots pints of water. I remember that, about two years ago, I happened to be at the well about three o'clock in the afternoon, at which time a countryman made an end of his sixteenth pint, I still mean Scots measure; the truth of which I was assured of by several present. The fellow said that he had neither vomited, nor been any other way uneasy, than for a short while troubled with a giddiness of his head. He had been only eight hours in throwing this monstrous quantity into his stomach.

I never prescribe, where I have access to advise, to grown men, more than three chopins, or a quart at most, and this quantity but seldom,

dom, always adviſing them to begin with a leſſer quantity, and increaſe gradually, till they come to a proper quantum. Women and men of weak conſtitutions, I ſeldom adviſe to drink more than a pint, and that with the reſtrictions juſt mentioned. To children, I preſcribe according to their age and conſtitution, from a gill, or half an Engliſh pint, to a chopin; or, though very rarely, three Engliſh pints. Such as approach to the age of men and women, drink in proportion.

As to preparatory medicines, an emetic or two, and two or three cathartic doſes ſhould, in ſomes caſes, be given. Theſe doſes may be preſcribed more or leſs frequent according to the diſeaſe and conſtitution of the patient. The medicines commonly uſed during the drinking of the waters, are in the beginning larger doſes of *ſal glauberi* and *polychreſtum*, and afterward leſſer quantities; of theſe two ſalts I prefer the laſt for frequent uſe: Syrup of buck thorn is often taken along with the water, and Aix-ſulphur is pretty much uſed, and with ſome agrees very well. There is alſo a preſcription of pills very much in uſe here; they were ordered by an eminent phyſician, when he was at the well ſeveral years ago, and given by him to an apothecary for a general recipe to all ſuch who ſhould at any time uſe the water. Theſe pills are a compoſition of gambogia, reſin of jalap, aloes, and (if I miſtake not) ſcammony, which, to all intents, are a ſtrong hydragogue.

And here I cannot but obſerve a general practice which I can by no means approve, *viz.*

the exorbitant uſe of purging medicines along with the water. There is nothing more ordinary among the meaner ſort, than to take large quantities of common ſea-ſalt in the water, and with theſe of better condition, to uſe in like manner what is falſely called Epſom-ſalt, and is little different from the other; with theſe, and ſometimes with Glauber's ſalt, they purge themſelves briſkly. But what makes it yet more unjuſtifiable, they repeat every day, or every other day, theſe doſes during the whole time of drinking the waters. I do not however diſpute againſt the uſe of theſe purges in all caſes, ſince they may be ſometimes neceſſary, as they actually are in the firſt days of drinking; but only am of opinion, that they ſhould not be ſo much or ſo long inſiſted on. Though I have frequently ſeen the bad conſequences of theſe methods, I ſhall only take notice, that, from the ſtricteſt obſervations I have been able to make, I can diſcover this water to be only an alterant and diuretic. It is true, it generally opens the belly, and with ſome it purges. As to the firſt, I believe a quantity of any water might have ſomething of the like effect, though I acknowledge that this does it more than common water, by reaſon perhaps of the mineral ſalt in it; yet I cannot find that it operates as a ſtrong or univerſal cathartic; for, as to its purging with ſome, I believe that will be found owing to their drinking too large quantities, or to a very lax ſtate of the ſtomach and inteſtines, or to ſome ſingularity of conſtitution.

Upon the whole, if the water paſſes freely by urine, and keeps the belly open, there will be

be leſs need of any helps; but, till that is effectuated, both cathartics and diuretics ſhould be given. If the water ſtay in the body long, it will be neceſſary to let blood, which will facilitate the operation of diuretics, and prevent feveriſh fits. A ſmall glaſs of Liſbon wine, in which aromatic and bitter materials have been infuſed, taken at, or ſoon after the time of drinking the water, helps weak ſtomachs to digeſt it, and prevents that heavineſs and inclination to ſleep, which tender people complain of, after drinking the water. To women who are hyſteric, and men that are much in the ſame condition with weak ſtomachs, ſinking ſpirits, *&c.* I give *ſal ſuccini*, either by itſelf, or mixed with other diuretics, and in ſuch caſes, I have always found it to anſwer very well.

The regimen, during the uſing of the water, needs not be very ſtrict: Milk, ſalted meats, eggs, and fiſh, are not a very proper diet. Riding and moderate exerciſes aſſiſt the water. I need not mention temperance, avoiding colds, *&c.* After dropping the uſe of the waters, there is no great neceſſity in general of taking any medicines; but I ſhall have occaſion below to take notice in what diſtempers they are moſt neceſſary.

The water of Moffat-wells is of great ſervice in grippings of the guts, colics, and pains in the ſtomach. I need not obſerve, that bathing in it gives relief in grippings and colic pains, ſince all tepid baths do the ſame. I have frequently obſerved it do great ſervice in bilious and nephritic colics; yea, I have known it cure perſons who had been long troubled with

nervous and hysteric colics. It is true, in these disorders, it sometimes fails; but I am persuaded it would succeed better, if such patients insisted less on being purged, by drinking too large quantities of the water, taking too often purging salts with it, or perhaps both; for my part, instead of endeavouring to purge such patients, (except the first day or two, or in cases of necessity), if I find the water have that effect, I frequently give a dose of laudanum at bed-time. I have known drinking and bathing very much lessen or entirely remove pains in the stomach with or without a swelling, even when the distemper had been of long continuance: Of this we have daily instances, as well as of its wonderfully strengthening weak stomachs, recovering the tone of the fibres, and creating an appetite even to such as had long lost all relish for victuals by continual debauches, drinking of spirits, &c. In a word, I believe this water to be second to few medicines in most disorders of the stomach and intestines.

The gravel is another distemper for which this water is very proper, for it frequently carries off great quantities of sand, and clears the urinary passages, curing ischuries, and, if I was not mistaken in the diagnostic, ulcerated kidneys. As to the stony gravel, I do not know that it has done any great service in that case, except perhaps by dislodging the stones from the kidneys, while they were yet small enough to pass through the ureters. I believe it would not be amiss, if such as are troubled with the gravel should drink for some days, both before and after

after the use of the waters, a decoction of the five opening roots, or some such emollient and diuretic materials.

Some use this water for the gout: I doubt not but it may be of some service, by bettering the stomach and juices; but I cannot vouch for any feats it has done in this distemper.

In the beginning of palsies it has done considerable service: Of this we had instances last summer in two gentlemen, who were troubled with a numbness, and almost total want of feeling, with a great feebleness of all their limbs, especially their legs; after being well purged, they used only the *sal succini* with the water, and that not every day; took a glass of bitters daily, and bathed thrice a week, using the water warm in the evening, and the same again cold next morning; at which time they continued only a few minutes in it. One of these gentlemen was perfectly recovered, and the other became much better: But I believe this water can do no great matters in the great nervous distempers when they are formed; it may, however, with the assistance of other medicines, be a preventer of these terrible maladies, by helping cachexies, sweetning the juices, &c. Many likewise find their account in this water, for bringing down an overgrown and unwieldy habit of body, and carrying off spontaneous lassitudes.

In obstructions of the menses, using half baths is very proper; but I cannot say I have found the drinking of the water answer directly as a provoker of these evacuations, only as it restores the vigour of the stomach, and betters the

the whole conſtitution, it is uſeful in ſuch caſes. It does ſervice in ſome hyſteric and melancholic ailments; and it is with juſtice famous for curing barrenneſs, which it has frequently done to ſuch as were even in deſpair of having children: And it has been found of great ſervice in all female weakneſſes, and moſt other diſorders incident to that ſex. It is alſo an excellent remedy in old gleets, whether natural or cauſed by venereal diſorders; only in this laſt caſe I would caution every one not to uſe the water, till they have reaſon to believe that the venereal taint is removed; for, if it is not, the water will, as effectually as any quack's medicine, throw the diſtemper into the blood.

Such as are troubled with rheumatic pains and aches, find, both from bathing and drinking, very great relief. Nor is this water a leſs ſovereign remedy to ſcorbutic patients, many of whom I have ſeen cured by it; they uſe it both ways, and many great cures have been brought about, even when the diſtemper had been of long continuance, when the limbs were monſtrouſly ſwelled and almoſt uſeleſs, and the ſkin covered all over with ſcales, ſcurf, and ſcabs: The water however is moſt to be depended on in the beginning of this diſeaſe, after general evacuations, and before it has gone beyond the ſecond ſtage, as deſcribed by Boerhaave in his aphoriſms on this ſubject; for certainly, when the fibres are all relaxed, the body dropſical, &c. this water can be little ſerviceable, if not detrimental: And of this we have yearly inſtances. It is likewiſe found to be a very good medicine, uſed both outwardly

and

and inwardly, for the itch, with which the country is peſtered; and cures the St Anthony's fire, which perhaps is ſomething a-kin to the ſcurvy or itch, and is alſo very frequent here and in the neighbourhood: Theſe roſes, as the country people call them, return to many in the ſpring and autumn, and are introduced by a ſmall fever. In a word, this water is a good medicine in moſt cutaneous eruptions and foulneſſes.

I come now to the king's evil; but, before I make any obſervations about it, I ſhall premiſe, by way of caution, that in this and all other diſtempers for which people reſort to this place, the water is not to be drank while the patient has a cough, even though a ſlight one, for it ſeldom fails to increaſe and bind it: It is alſo to be preſcribed with caution when the patient is hectically diſpoſed; and it will moſt certainly do miſchief where there are tubercles or other infarctions in the lungs. But, theſe caſes only excepted, the water may be uſed with great freedom.

Before the ſcrophulous patient begins to make uſe of the water, he ought to be vomited and well purged; nor would it be amiſs for him to take ſome doſes of ſweet mercury in the intervals of his purging: It is true, many ſcrophulous patients cannot with ſafety take mercury, and I do not think, that it ought with any to be much or long inſiſted on; but I have experienced that a few doſes of it have agreed with many, and promoted the ſucceſs of the water; to theſe patients I frequently give ſome doſes of rhubarb by itſelf, or with two or three grains

grains of calomel, on the days when the drinking of the water is omitted. In these intervals I likewise give antiscorbutic infusions of juices, and, at other such times, emollient and diuretic infusions or decoctions: These may be helps, but the water itself is mostly to be relied on; and, in my opinion, the cure is chiefly owing to the drinking, though, without doubt, the external application is of considerable service in cleaning the sores, easing the pain, healing the ulcers, and otherwise; yet, while the scrophulous humour is in any quantity in the blood, the ulcers either do not heal, or close up fungous, and soon break out again in the same or another place: But, when that venom is thrown out or overcome, all the ulcers heal up surprisingly in a few days; which makes me believe, that the many and great cures performed here upon scrophulous patients, are in a great measure to be ascribed to the drinking of the water. Where the ulcers are foul and fungous, red and yellow precipitate, burnt alum, or some such escharotic powders, are used by themselves or mixed with some ointment for cleaning: To the same purpose are used *ung. Ægyptiacum, balsam. viridi. &c.* When the lips of the ulcers are inflamed, and the parts round them swelled and hard, besides fomenting with the water, and the other methods of applying it hinted above, there are used emollient fomentations, cataplasms, and various plaisters to the same intent, the best of which I find that to be that made of two parts *gum galbanum*, and one part melililot plaister. This paper would swell to too great a bulk, and perhaps be less suited to your design,

design, if I should give a particular account of the various appearances of this disease in the many scrophulous patients I have seen cured here: I shall therefore only take notice, that it is proper for the scrophulous, after dropping the use of the waters, to recommence purging and mercurial doses for some time, and to persist in the use of emollient and diuretic medicines, and among these chiefly the millipedes.

To conclude all, I can assure you I have never once seen this mineral water fail to cure the scrophulous, when they were able or fit to use it, that is, when the constitution was not quite decayed, or when they were free from the diseases that forbid its use, and when they were willing to allow it a sufficient time, and that is only a few seasons.

VIII. *Experiments on the Medicinal Waters of* Moffat; *by* ANDREW PLUMMER, M. D. *Fellow of the Royal College of Physicians, and Professor of Medicine in the University of* Edinburgh.

HAVING obtained, by the favour of Mr Milligen, a considerable quantity of the mineral water of Moffat, carefully put up at the fountain in the month of April, and a parcel of stones taken from the bottom of the upper well, and some dug from the same vein as it crosses the rivulet below the precipice upon which the wells stand, I thought an attempt to discover the nature of the celebrated mineral water, by a chemical analysis and other experiments of that kind, would not be unacceptable

unacceptable to the curious, and might, in some measure, be useful to illustrate its effects in the cure of diseases.

Above sixty years ago, Mr Mackaile published a topographico-spagyrical description of Moffat-wells; in which he concludes, but from very precarious principles, that this water is impregnated with the putid sulphur of antimony and nitre; but in another place he thinks it necessary to add to these natural *sal ammoniac*: This gentleman indeed writes in the dialect of an adept, but most unlike a true chemist, declares against experiments, and asserts, that an analysis of the water would be to no purpose, and therefore never made the trial. I shall not trouble the reader with any further remarks on this author, but shall impartially relate the experiments I made on this water, and the stones taken from the vein on which it runs.

The mineral water tried by the hydrostatical balance at the fountain, and compared with the water of a rivulet near the well, was found somewhat lighter than it; for the specific gravity of the mineral water was to that of the other water as 838 to 840.

The mineral water brought from Moffat to Edinburgh, in bottles well corked and waxed about the neck, had a strong sulphurous smell, but appeared equally limpid and clear as common spring-water, though at the fountain it has a milky or bluish colour: Upon the first opening of the bottle the water tasted as strong, to my sense, as when I have drank it at the well; but next day, the bottle being half empty, the water

water had quite loſt its diſtinguiſhing taſte and ſmell.

I put ſome grains of the freſh powder of galls into a ſmall quantity of the water, but it did not ſtrike a black or violent tincture therewith, though I ſet the glaſs in a ſand-heat for ſome hours. A ſtrong infuſion of red roſes in common water poured into an equal quantity of the mineral water, was only diluted and made fainter, as if ſo much ſimple water had been added to the infuſion, and the ſame happened with ſyrup of violets. This water then gave no marks of chalibeat nature with galls, nor of acidity with tincture of roſes, or ſyrup of violets; neither did it produce any effervescence with alcaline liquours, as *ol. tartar. p. d.* or *ſpir. ſal. ammoniac.* only, when the firſt was dropped into the water, there appeared a faint blue cloud ſuſpended in it. Acid liquors, as *ſp. et ol. vitriol. ſp. nitr. &c.* added to theſe mixtures with alcalis, after an effervescence, produced a milky colour, but no precipitation. The ſame acid liquors dropped into the ſimple mineral water made no ſenſible effervescence, only the mixture with *ſp. nitri* ſmoked a little, and ſome bubbles of air roſe from the bottom, but all of them turned the water more or leſs milky. Theſe phænomena diſcover the ſulphureous nature of the water, but this ſulphur muſt be very ſubtile, volatile, and in ſmall quantity, ſeeing the water expoſed to the air ſoon loſes that ſmell and taſte which at firſt ſo remarkably affected the organs of theſe ſenſes; and ſeeing acid liquors cannot ſo unite the particles of this ſulphur as to make them

fall to the bottom, or separate from the water.

I made a great many attempts to fix this sulphur, and render it conspicuous, but without success, and therefore I shall not trouble the reader with these fruitless experiments; only there is one which had almost led me into a mistake, until, by further prosecuting the experiment, I discovered the truth: But having spoke of this matter to some gentlemen before I knew my error, I must take this opportunity to relate the whole matter. Having put a few grains of *saccharum* or *vitriolum saturni* (made with *aq. fort. simpl.* diluted with a triple quantity of common water and litharge) into two ounces of Moffat water, this presently turned of a reddish colour, after standing some minutes, the water grew more pellucid, and the red particles uniting, fell mostly to the bottom, and some small flakes swam on the surface: This matter separated from the water resembled the *sulphur auratum antimonii*; and indeed I imagined that this was the sulphur which impregnates the water coagulated and fixed. That I might therefore procure a sufficient quantity of this matter to discover its nature by other trials, I got a fresh parcel of mineral water from Moffat, and repeated the experiment: I put 3 drams of the *vitriolum saturni* by degrees into 3 chopins or English quarts of the water, and poured the muddy liquor into a filter, in which there remained a powder not so red as in the former experiment, but of a brownish colour, which when dry weighed 20 grains. I put 5 grains of this powder upon an iron-plate made red hot, it

soon

ſoon melted and ſmoked a little, but did not flame; when the iron was cold I found upon it a thin ſcurf of lead. Upon the reſt of this powder I poured ſome *ol. tartar. p. d.* and ſet the glaſs to digeſt on a ſand-heat, but the liquor acquired no tincture as it would have done from a ſulphureous ſubſtance: So that in this experiment the acid of the *vitriolum ſaturni* mixing with the water, had let fall ſome of the particles of the litharge, which by fire afterwards returned to lead. That I might know what remained in the water which had paſſed through the filter, I put about the half of it into an iron kettle, to evaporate it in haſte, and I got a drachm and 5 grains of a ſaline or vitriolic ſubſtance, of a brown colour, and not ſo ſweet and ſtyptic to the taſte as the *vitriolum ſaturni*, which was diſſolved in the water. The difference, I preſume, was owing partly to ſome of the litharge being precipitated, partly to the iron kettle in which it was boiled, and laſtly to ſome of the proper ſalt of the water, being united to this vitriolic ſubſtance..

Twelve Scots pints of the mineral water was diſtilled with a gentle heat, from glaſs veſſels, with the joinings luted; the water which came over was perfectly limpid, and had no ſmell or taſte, but a little empyreuma; what remained in the body had no ſmell either, but taſted ſomewhat ſaltiſh. When $\frac{1}{4}$ or thereby was brought over, there appeared at the bottom a good quantity of muddy ſediment, which I ſeparated from the liquor, and carried on the evaporation in a low wide mouthed glaſs. When the water was reduced to ſomewhat leſs

than a chopin, it ſeemed well ſaturated with a ſalt; for it was thick and bubbled, as when a lixivial ſalt is boiled near to dryneſs. When all was cold, I found at the bottom a dirty ſalt, mixed with mud or earth; the ſaline particles were ſo very ſmall, that I could not obſerve their ſhapes; but the liquor had a very briny or muriatic taſte. I proceeded to evaporate and cryſtalize the remaining liquor, (except two ounces reſerved for other trials) till I gathered all the ſalt, which weighed 4 drachms and 2 ſcruples. As this ſalt was very brown and earthy, I diſſolved in ſome of the diſtilled water, filtered the ſolution, and cryſtalized it again; then there appeared very clean and beautiful cryſtals, of an uncommon figure, of very different ſizes, but almoſt exactly ſimilar; ſome of which are repreſented of their natural bigneſs on plate I.

Fig. I. Shews a ſmall cryſtal, but very compleat and regular.

Fig. 2. Repreſents one of the largeſt, ſomewhat rugged at the corners.

Fig. 5. Is the reverſe of the former, ſhewing its ſtalk.

Fig. 3. Shews two joined by one ſide.

Fig. 4. Repreſents 2 irregularly blended.

Each of theſe cryſtals is made up, as it were, of four triangles joined together, ſo as to make up a little hollow capſule or diſh, with brims turned outward or horizontally, and ſtands upon a little pedeſtal or ſtalk. Beſides theſe cryſtals there were others of a cubical ſhape, but both ſorts had evidently the taſte of ſea ſalt.

I put two drachms of the ſalt obtained from

Moſſat

Moffat water into an iron laddle, and set it on a clear fire, till the iron was red hot; the salt smoked and crackled much as in the decrepitation of common salt, but it neither melted nor flamed, nor did it much diminish in weight; for, after an hour's toasting, it had only lost 18 grains; which makes it evident that this salt is neither *nitre* nor *sal ammoniac*.

This decrepitate salt, with four scruples of the salt which had not felt the fire, was put into a small glass retort, and, a drachm of oil of vitriol poured upon it, there arose copious fumes, which were immediately confined, by applying a receiver: The distillation was carried on with a fire gradually increased, the receiver was filled with white fumes, and there came over about two drachms of a volatile smoking spirit, which answered all the characters of Glauber's spirit of sea salt.

Having dissolved some silver in *aqua fortis*, I divided the solution into several portions; into one I let fall some drops of the spirit above described; into another I put some grains of the salt of Moffat water, into a third some of the water evaporated to $\frac{1}{10}$, and each of these made a precipitation of the silver. All which plainly show that this water is impregnated with common salt or sal-gem. Altho' the saline crystals obtained from Moffat water differ very much in appearance from the sea salt commonly used, yet having dissolved some common salt in pure water, after filtration, and a very slow evaporation, I observed many of the saline particles assume a shape not unlike that described above; but the crystals of the com-

mon salt approached nearer to little hollow pyramids, with square bases.

I mentioned before that I had reserved two ounces of the water, when it was evaporated to $\frac{1}{16}$ or thereby, and was strongly impregnated with salt. Into a small qnantity of this brine (as I may call it) I let fall some drops of *ol. tartar. p. d.* which caused no effervescence, which presently produced a milky colour and coagulation; upon standing a while, the upper part of the liquor turned clear, and of a whey colour. The same happened when *spir. sal. ammon cum alcal. fixo* was dropt into another small parcel of the same water; some drops of *spir. vitriol.* put into these mixtures, after effervescence, dissolved the coagulation, and rendered the liquor pellucid: But *sp. vitriol.* or other acid liquors dropt into the brine by itself, caused no effervescence, or other change in colour or consistence. The difference between these phænomena and those formerly observed in the fresh water, upon mixing the same liquors, is remarkable; for, when acid spirits were dropt into the fresh water, they always turned it milky, because then the water was impregnated with its sulphur, which the acid liquors, in some measure, coagulated so as to change the colour of the water: But alcaline liquors added to the fresh water produced little change, because a small quantity of salt was dispersed through a great bulk of water. On the other hand, when the sulphur was carried off by heat, and the salt gathered into narrower bounds, then the acids had no effect, but the alcalis had a considerable one, by joining

ing themſelves to the particles of ſalt, and collecting them together.

The muddy ſediment which was at firſt ſeparated from the water, when dry, weighed 25 grains; it was of a ſandy colour, and had a little ſaltneſs on the tongue. I put this powder into an iron ſpoon, made red hot, and kept it on the fire; it ſmoked a little, turned black on the ſurface, afterwards red, and at laſt perfectly white. When cold it weighed 17 grains, and felt like chalk.

The earth which was ſeparated from the ſolution of the ſalt by filtration, weighed 15 grains. It had no ſaltneſs, but was more gritty between the teeth than the former. When calcined, it ſmoked little, ſcarce changed its colour, and, when cold, weighed 10 grains.

I poured upon ſmall parcels of theſe earthy ſubſtances both acid and alcaline liquors; but the remains were ſo ſmall, that I could not diſcover whether they contained any metallic particles or not.

The ſtones dug from the vein, as it paſſes thro' the bottom of the upper well at Moffat, are made up partly of a cryſtaline ſpar, cut, as it were, into many poliſhed ſurfaces like diamonds, partly of a ſhining ſubſtance of a golden colour, but moſtly of a duſky or leadiſh-coloured ore.

Though theſe ſtones ſeemed to abound in ſulphur, yet none of it would ſublime in cloſe veſſels; but, to obtain it in ſome ſhape, I poured upon two ounces of the ore in powder a ſolution of ſalt of tartar; by digeſtion this extracted a very deep-red tincture, from which

by

by pouring in *ſpir. vitriol.* I got a powder of a citron colour, weighing 17 grains, which put upon a red-hot iron made a faint blue flame, and had a ſulphureous ſmell.

Two ounces of the ſame mineral, mixed with an equal quantity of tartar and nitre in powder, was put into a red-hot crucible in a melting furface; after half an hour's fuſion, the matter was thrown into an hollow cone, or antimonial horn, it did not ſeparate into a metallic or reguline part and ſcoriæ; but there appeared many ſhining particles diſperſed thro' the maſs, like very foul antimony. The whole was again reduced to a powder, and water poured on it, which acquired a very foetid and ſulphureous ſmell, and a taſte much reſembling the freſh mineral water, but much ſtronger. This water likewiſe, with ſpirit of vitriol, afforded a ſulphur like the former. The metallic matter, freed from the ſalts by frequent waſhing, was again brought to fuſion with nitre and tartar, and now I find at the apex of the cone, a piece of very pure copper, weighing 42 grains, which anſwered all the characters of that metal.

I acknowledge that I could not diſcover any marks of copper in the water itſelf, by any trials I could make; but as this water waſhes a vein abounding with copper and ſulphur, and is itſelf impregnated with ſalt, I may conclude that the principles contained in this medicinal water, are a very ſubtile and volatile ſulphur, at leaſt ſome conſtituent parts of ſulphur, ſome particles of copper and *ſal-gem*, or common ſalt.

IX. *An ESSAY on the Art of* injecting *the Veſſels of Animals; by* ALEXANDER MONRO, *Profeſſor of Anatomy in the Univerſity of* Edinburgh, *and* F. R. S.

THE method of filling the veſſels of animals with a coloured liquor, which afterwards hardens, and, by keeping the veſſels diſtended and firm, gives an opportunity of obſerving more exactly their diſtribution, ſituation, and diameters, and of diſcovering numbers of their branches and communications that would otherwiſe be unſearchable, is a modern improvement, that has contributed conſiderably to explain the animal oeconomy. Anatomiſts are now ſufficiently acquainted with the manner of filling the larger trunks; but few have hit on the art of injecting the very ſmall capillary tubes; therefore I hope it will not be unacceptable to give you a detail of what I have found, after a conſiderable number of different trials, to have ſucceeded beſt in this way of injection, which may at leaſt have one good effect, though I ſhould fail of being the diſcoverer of this art, namely, of ſaving unneceſſary trouble to other inquirers after it, and may ſpur on ſome other more lucky perſon to communicate the whole of it, by which, more anatomiſts being employed in ſearching out the minute veſſels, more diſcoveries may be made, than when it is confined to ſo few as it is at preſent.

In deſcribing the trials I have made to ſucceed in ſubtile injections, I can ſcarce help mentioning

tioning ſeveral things which are commonly known to all who practiſe injections of any kind; and I ſhall be the leſs anxious to ſhun them, that ſcarce any anatomical books deſcribe with accuracy the method of injecting; and therefore this eſſay may ſave the young unexperienced anatomiſt the trouble of fruitleſs trials, which I beg you will accept of as an apology for repeating things that have been long familiar to you.

The inſtrument with which the liquor is commonly thrown into the veſſels is, you know, a tight eaſy-going ſyringe of braſs, to which ſeveral ſhort pipes are fitted, and can be fixed by ſcrews, the other extremities of theſe pipes being of different diameters without any ſcrew, that they may ſlide into other pipes which are ſo exactly adapted to them at one end, that, when they are preſſed a little together, nothing can paſs between them: And becauſe their coheſion is not ſo great as to reſiſt the puſhing force of the injection, which would drive off this ſecond pipe, and ſpoil the whole operation; therefore the extremity of this ſecond ſort of pipes, which receives the firſt kind, is formed on the outſide into a ſquare, bounded behind and before by a riſing circle, which hinders the key that cloſely graſps the ſquare part from ſliding backwards or forwards; or a bar of braſs muſt ſtand out from each ſide of it to be held with the fingers. The other extremity of each of theſe ſecond ſort of pipes is of different diameter, and near it a circular notch, capable of allowing a thread to be ſunk into it, is formed; by this the thread tying the veſſel at

which

which the injection is to be made, will not be allowed to slide off.

Besides this form described, common to all this second sort of pipes, we ought to have some of the larger ones with an additional mechanism for particular purposes; as for instance, when the larger vessels are injected, the pipe fastened in the vessel ought either to have a valve or a stop-cock that may be turned at pleasure, to hinder any thing to get out from the vessel by the pipe; otherwise, as the injection in such a case takes time to coagulate, the people employed in making the injection must either continue all that while in the same posture; or, if the syringe is too soon taken off, the injected liquor runs out, and the larger vessels are emptied. When the syringe is not large enough to hold at once all the liquor necessary to fill the vessels, there is a necessity of filling it again: If, in order to do this, the syringe was to be taken off from the pipe fixed in the vessel, some of the injection would be lost, and what was exposed to the air would cool and harden; therefore some of the pipes ought to have a reflected curve tube coming out of their side, with a valve so disposed that no liquor can come from the straight pipe into the crooked one, but, on the contrary, may be allowed to pass from the crooked to the straight one; the injector, then taking care to keep the extremity of the reflected pipe immersed in the liquor to be injected, may, as soon as he has pushed out the first syringe full, fill it again by only drawing back the sucker, and, repeating this

this quickly, will be able to throw several syringe-fulls into the vessels.

All these different sorts of pipes are commonly made of brass.

The liquors thrown into the vessels with a design to fill the small capillary tubes are either such as will incorporate with water, or such as are oily; both kinds have their advantages and inconveniencies, which I shall mention in treating of each, and shall conclude with that which I have found by experience to succeed best.

All the different kinds of glue, or ichthyocolla, syths, common glue, &c. dissolved and pretty much diluted, mix easily with the animal fluids, which is of great advantage, and will pass into very small vessels of a well-chosen and prepared subject, and often answer the intention sufficiently, where the design is only to prepare some very fine membrane, on which no vessels can be expected to be seen so large as the eye can discover whether the transverse sections of the vessels would be circular, or if their sides are collapsed. But, when the larger vessels are also to be prepared, there is a manifest disadvantage to the usefulness and beauty of the preparation; for, if nothing but the glutinous liquor is injected, one cannot keep a subject so long as the glue takes of becoming firm; and therefore, in dissecting the injected part, several vessels will probably be cut and emptied: To prevent this, one may indeed either soak the part well in alcohol, which coagulates the glue; but then it becomes so brittle, that the least handling makes it crack; and if the preparation

paration is to be kept, the larger veſſels appear quite ſhriveled, when the watery part of the injection is evaporated; or the efflux of the injection may be prevented by carefully tying every veſſel before we are obliged to cut it; ſtill however that does not hinder the veſſels to contract when the glue is drying. If, to obviate theſe difficulties, the glutinous liquor ſhould firſt be injected in ſuch quantity as the capillary veſſels will contain, and the common oily or waxy injection is puſhed in afterwards to keep the larger veſſels diſtended; the wax is very apt to harden before it has run far enough; the two ſorts of liquors never miſs to mix irregularly, and the whole appears interrupted and broken by their ſoon ſeparating from each other; which is ſtill more remarkable afterwards, when the watery particles are evaporated.

Spirits of wine coloured mixes with water and oils, and ſo far is proper to fill the very ſmall veſſels with; but, on the other hand, it coagulates any of our liquors it meets, which ſometimes block up the veſſels ſo much, that no more injection will paſs; then it ſcarce will ſuſpend ſome of the powders that prove the moſt durable colours; and, as it entirely evaporates, the veſſels muſt become very ſmall; and the ſmall quantity of powder left, having nothing to ſerve for connecting its particles together, generally is ſeen ſo interrupted, that the ſmall ramifications of veſſels rather have the appearances of random ſcratches of a pencil, than of regular continued canals.

Melted tallow, with a little mixture of oil of turpentine, may ſometimes be made to fill

very small veſſels, and keeps the larger ones at a full ſtretch; but, where any quantity of the animal liquors are ſtill in the veſſels, it is liable to ſtop too ſoon, and never can be introduced into numbers of veſſels which other liquors enter; and it is ſo brittle that very little handling makes it crack, and thereby renders the preparation very ugly*.

The method I have always ſucceeded beſt with, in making what may be called ſubtile or fine injections, is, firſt to throw in coloured oil of turpentine, in ſuch a quantity as might fill the very ſmall veſſels, and, immediately after, to puſh the common coarſe injection into the larger ones. The oil is ſubtile enough to enter rather ſmaller capillary tubes than any colouring can; its reſinous parts, which remain after the ſpiritous are evaporated, give a ſufficient adheſion to the particles of the ſubſtance with which it is coloured, to keep them from ſeparating, and it intimately incorporates with the coarſer injection, by which, if the injection is rightly managed, it is impoſſible for the ſharpeſt eye to diſcover that two ſorts have been made uſe of †.

All

* *Rigierus* (*introduct. in notitiam rerum natur. et arte factæ ato Hagæ* 1743, *titul. balſamam*) gives Ruyſch's method of injecting and preſerving animals, which, he ſays Mr Blumentroſt, preſident of the Petersburgh academy, aſſured him was copied from the receipt given in Ruyſch's own hand-writing to the Czar. According to this receipt, melted tallow, coloured with vermilion, to which, in the ſummer, a little white wax was added, was Ruyſch's injecting *teracea materies*.

† Mr Ranby's injecting matter, as publiſhed by Dr Hales, *Hæmaſt.* Ex. 21,) is white roſin and tallow of each two Ounces,

All the liquors with which the veſſels of animals are artificially filled, having very faint and near the ſame colours, would not at all appear in the very ſmall veſſels, becauſe of their becoming entirely diaphanous, without a mixture of ſome ſubſtance to impart its colour to them, and where ſeveral ſorts of even the larger veſſels of any part were filled, one ſort could not be diſtinguiſhed from another, unleſs the colour of each was different; which has likewiſe a good effect in making preparations more beautiful. Wherefore anatomiſts have made uſe of a variety of ſuch ſubſtances, according to their different fancies or intentions, ſuch as gamboge, ſaffron, ink, burnt ivory, &c. which can be eaſily procured from painters. My deſign being only to conſider thoſe that are fit to be mixed with the injecting liquors propoſed to fill capillary veſſels, which is ſcarce ever to be done in any other, except the branches of the arteries and of ſome veins, I ſhall confine myſelf to the common colours employed to theſe laſt named two ſorts of veſſels, which colours are red, green, and ſometimes blue, without mentioning the others which require very little choice.

Anatomiſts have, I imagine, propoſed to imitate the natural colours of the arteries and veins in a living creature, by filling the arteries with a red ſubſtance, and the veins with a blue or green; from which however there are o-

ounces, melted and ſtrained through linen, to which was added three ounces of vermilion, or finely ground indigo, which was firſt well rubbed with eigh ounces of turpentine varniſh.

ther advantages, such as the strong reflection which such bodies make of the rays of light, and the unaptness most such bodies have to transmit these same rays, without, at least, a considerable reflexion of the rays peculiar to themselves, or, in other words, their unfitness to become compleatly pellucid; without which the very fine vessels, after being injected, would still be imperceptible. The animal or vegetable substances made use of for colouring injections, such as chochineal, laque, *rad. anchusiæ*, brazil-wood, indigo, &c. have all one general fault of being liable to run into little knots which stop some of the vessels; their colour fades sooner when kept dry; they more easily yield their tincture when the parts are preserved in a liquor; and rats, mice and insects will take them for food; for which reasons, though I have frequently succeeded in injecting them, I rather prefer the mineral kind, such as minium or vermilion for red, of which this last is, in my opinion, the best, because it gives the brightest colour, and is commonly to be bought finely levigated. The green coloured powder generally used is verdigrease; but I rather chuse that preparation of it, called *distilled verdigrease*; because its colour is brighter, and it does not so often run into small knots as the common verdigrease, but dissolves in the oily liquors.

The method of preparing the injection composed of these materials is, to take, for the fine one, a pound of clear oil of turpentine, which is gradually poured on three ounces of vermilion or distilled verdigrease finely powdered, or rather well levigated by grinding on marble; stir them

them well with a ſmall wooden ſpatula till they are exactly mixed, then ſtrain all through a fine linen rag: The ſeparation of the groſſer particles is, however, rather better made, by pouring ſome ounces of the oil upon the powder, and, after ſtirring them together ſtrongly, ſtop rubbing with the ſpatula for a ſecond or ſo, and pour off into a clean veſſel the oil with the vermilion or verdigreaſe ſuſpended in it; and continue this ſort of operation till you obſerve no more of the powder come off, and all that remains is granulated. The coarſer injection is thus prepared: Take tallow, 1 pound, wax, bleached white, five ounces, ſallad oil, 3 ounces, melt them in a ſkillet put over a lamp; then add Venice turpentine, 2 ounces; and, as ſoon as this is diſſolved, gradually ſprinkle in of vermilion or verdigreaſe prepared, 3 ounces; then paſs all through a clean dry, warmed linen-cloth, to ſeparate all the groſſer particles; and, when you deſign to make it run far into the veſſels, ſome oil of turpentine may be added immediately before it is uſed.

The next thing to be conſidered, and indeed what chiefly contributes to the ſucceſs of injections, is, the choice and preparation of the ſubject whoſe veſſels are to be filled.

In chuſing a fit ſubject, take theſe few general rules: 1. The younger the creature to be injected is, the injection will, *cæteris paribus*, go fartheſt, and *vice verſa*. 2. The more the creature's fluids have been diſſolved and exhauſted in life, the ſucceſs of the operation will be greater. 3. The leſs ſolid the part deſigned to be injected is, the more veſſels will be filled.

4. The more membranous and transparent parts are, the injection shows better. Whereas, in the solid very hard parts of a rigid old creature, that has died with its vessels full of thick strong blood, it is scarce possible to inject great numbers of small vessels.

Therefore, in preparing a subject for injecting, the principal things to be aimed at, are, To dissolve the fluids, empty the vessels of them, relax the solids, and prevent the injection's coagulating too soon. To answer all these intentions, authors have proposed to inject tepid or warm water by the arteries, till it returns clear and untinged by the veins, and the vessels are thereby so emptied of blood, that all the parts appear white, after which they push out the water by forcing in air: And, lastly, by pressing with their hands, they squeeze the air also out. After this preparation, one can indeed inject very subtilely, but generally there are inconveniencies attend it; for, in all the parts where there is a remarkable *tunica cellulosa*, it never misses to be full of the water, which is apt to spoil any parts designed to be preserved either wet or dry; and some particles of the water seldom miss to be mixed in the larger as well as smaller vessels with the oily injection, and make it appear discontinued and broken: Wherefore it is much better to let this injection of water alone, if it can be possibly avoided, and rather to macerate the body or part to be injected a considerable time in water made so warm * as one can hold his hand easily

* Ruysch orders a previous maceration for a day or two in cold water, which must have a better effect in melting the blood than warm water has.

eaſily in it; taking care to keep it of an equal warmth all the time, by taking out ſome of the water as it cools, and pouring in hot water in its place; by which the veſſels will be ſufficiently ſoftened and relaxed, the blood will be melted down, and the injection can be in no danger of hardening too ſoon; whereas, if the water is too hot, the veſſels ſhrink, and the blood coagulates: From time to time, we ſqueeze out the liquids as much as poſſible at the cut veſſel by which the injection is to be thrown in*. The time this maceration is to be continued, is always in proportion to the age of the ſubject, the bulk and thickneſs of what we deſign to inject, and the quantity of blood we obſerve in the veſſels, which can only be learned by experience; at leaſt, however, care ought to be taken, that the whole ſubject or part macerated is perfectly well warmed all through: and that we continue the preſſure with our hands, till no more blood can be brought away, whatever poſition we put the ſubject in.

When the ſyringe, injections, and ſubject are all in readineſs, one of the ſecond ſort of pipes is choſen, as near to the diameter of the veſſel by which the injection is to be thrown as poſſible; for, if the pipe is too large, it is almoſt needleſs to tell it cannot be introduced. If the pipe is much ſmaller than the veſſel, it is ſcarce poſſible to tie them ſo firmly together, but, by the wrinkling of the coats of the veſſel, ſome ſmall paſſage will be left, by which part of

* When Ruyſch intended to inject the whole body, he put one pipe upwards, and another downwards, in the deſcending aorta.

of the injection will spring back on the injector, in the time of the operation, and the nearest vessels remain afterwards undistended, by the lose of the quantity that ouzes out. Having chosen a fit pipe, it is introduced at the cut orifice of the vessel, or at an incision made in the side of it; and then a waxed thread being brought round the vessel, as near to its coats as possible, by the help of a needle, or a flexible eye'd probe, the surgeon's knot is made with the thread, and it is drawn as firmly as the thread can allow; taking care that it shall be sunk into the circular notch of the pipe, all round, otherwise it will very easily slide off, and the pipe will be brought out probably in the time of the operation, which ruins it.

If there have been large vessels cut, which communicate with the vessels you design to inject, or if there are any others proceeding from the same trunk, which you do not resolve to fill, let them be all carefully now tied up, to save the injected liquor, and make the operation succeed better in the view you then have.

When all this is done, both sorts of injections are to be warmed over a lamp, taking care to stir them constantly, lest the colouring powder fall to the bottom and burn*. The oil of turpentine needs be made no warmer than will allow the finger to remain in it, if the subject has been previously well warmed in water, when the maceration has not been made, the oil ought to be scalding hot, that it may warm all the parts which are designed to

* Ruysch melts his tallow by the heat of warm water, into which he puts the vessel containing the injection.

to be injected. The coarſe injection ought to be brought near to a boiling. In the mean time, having wrapt ſeveral folds of linen round the parts of the ſyringe which the operator is to grip, and ſecured the linen with thread; the ſyringe is to be made very hot, by ſucking boiling water ſeveral times up*, and the pipe within the veſſel is to be warmed by applying a ſponge dipped in boiling water to it †.

After all is ready, the ſyringe being cleared of the water, the injector fills it with the finer injection, and then introducing the pipe of the ſyringe into that in the veſſel, he preſſes them together, and either with one hand holds this laſt pipe firm, with the other grips the ſyringe, and with his breaſt puſhes the ſucker; or, giving the pipe in the veſſel to be held by an aſſiſtant, in any of the ways mentioned in the diſcription of theſe ſort of pipes, he grips the ſyringe with one hand, and puſhes the ſucker with the other, and conſequently throws in the injection, which ought to be done ſlowly, and with no great force, but proportioned to the length and bulk of the part to be injected, and ſtrength of the veſſels. The quantity of this fine injection to be thrown in is much to be learned by uſe. The only rule I could ever fix to myſelf in this matter, was to continue puſhing till I was ſenſible of a ſtop, which would require a conſiderable force to overcome. But this will not

* He warms his ſyringe by laying it on hot coals.

† He warms his pipe, by putting the body, after the pipe is fixed in the veſſel, into hot water. When this is to be done, a cork ought to be put into the pipe, to prevent the water getting into the veſſel that is to be injected.

not hold where all the branches of any veſſel are not injected; as for inſtance, when the veſſels of the thorax only are to be injected; for the aorta bears too great a proportion to the branches ſent from it, and therefore leſs fine injection is requiſite here. As ſoon as that ſtop is felt, the ſucker of the ſyringe is to be drawn back, that the neareſt large veſſels may be emptied. Then the ſyringe is taken off, emptied of the fine injection and filled with the coarſer, which is to be puſhed into the veſſels quickly and forcibly, having always regard to the ſtrength and firmneſs of the veſſels, bulk, &c. of the part. Continue to thruſt the ſucker, till a full ſtop, or a ſort of puſh backwards is felt, when you muſt beware of thruſting any more, otherwiſe ſome of the veſſels will be burſted, and the whole, or a conſiderable ſhare of the preparation you deſigned, will be ſpoiled by the extravaſation; but rather immediately ſtop the pipe by the turn-cock, and take out the ſyringe to clean it, and allow ſufficient time for the coarſe injection to coagulate fully, before any part is diſſected*.

In this way I have frequently injected the cortical part of the brain, *tunica choroides* and *vaſculoſa* of the eye, periofteum of the bones of the ear, veſſels of the teeth, of the ſkin, bones, and viſcera; which any of you, gentlemen, may ſatisfy yourſelves of when you pleaſe, by ſeeing them. As a ſpecimen of the ſucceſs of this way I have ſent you herewith the figure

* Ruyſch, immediately after throwing in the injection, put the body into cold water, and ſtirred it continually for ſome time, to prevent the vermilion to ſeparate from the tallow.

gure of a little piece of the *tunica villoſa* of the inteſtines, at leaſt of that membrane which retains the air in the internal cellular coat of the inteſtines, when they are turned inſide out; and theſe cellules are diſtended by blowing. In *tab.* 1. *fig.* 6. you ſee this piece of membrane, as it appears to the naked eye; only that the deep red colour, with which it is tinged all over in the original, cannot appear here. In *fig.* 7. is repreſented the appearance it had when viewed with a microſcope. What looks like a ſort of moſs-work here, ſhews itſelf vaſcular, when it is viewed with a microſcope that magnifies more than the one employed when the painter drew this figure.

X. *A Demonſtration of the ſtrength of Bones to reſiſt Powers applied to break them tranſverſely, by* Dr WILLIAM PORTERFIELD, *Fellow of the Royal College of Phyſicians in Edinburgh.*

" Gentlemen,

IN the the ſecond edition of my Anatomy of the human Bones, juſt now printed, after demonſtrating, that the reſiſtance of two cylindrical bones of unequal diameters, but conſiſting of an equal number of ſimilar fibres, uniformly diſpoſed round each, to forces applied to break them tranſverſely, will be proportional to their diameters, I affirm, in page 28, That, of whatever figure bones are, and in whatever manner their fibres are diſpoſed, their ſtrength muſt always be in a ratio compounded of their quantity of bony mater, and of the diſtance of their center

center of gravity, from the center of motion. My worthy friend Dr Porterfield, who always examines accurately what he reads, having, to satisfy himself, drawn up, not only a demonstration of that propoſition; but having alſo conſidered the reſiſtances of bones in a great many more different views than I think our writers in mechanics commonly do the forces of bodies; and having accidentally let me ſee the incloſed paper, I prevailed on him to allow me ſend it you, as juſtly, in my opinion, deſerving a place in your collection; and being an excellent ſupplement to that part of my Oſteology. I am

Your moſt obedient ſervant,

ALEX. MONRO."

LEMMA.

THE ſum of the actions of two or more agents, conſpiring to act in parallel lines, is always as the ſum of their abſolute forces, multiplied into the velocity of their common center of gravity.

DEMONSTRATION.

Let A, B, *(tab. 1. fig. 8.)* repreſent the abſolute force of the agents A and B, whoſe common center of gravity is C; and let the parallel lines Aa, Bb, Cc, repreſent the velocities and directions of the agent A, the agent B, and their common center of gravity C, reſpectively: The action of agents being always as rectangles, under their abſolute forces and velocities,

velocities: The action of A, ſhall be $A \times Aa$, the action of B, $B \times Bb$; the ſum of their actions $A \times Aa + B \times Bb$, and the ſum of their abſolute forces multiplied into the velocity of their common centre of gravity, $A \times Cc + B \times Cc$. I ſay, $A \times Aa + B \times Bb = A \times Cc + B \times Cc$.

Caſe 1. If the velocities Aa and Bb are equal, they ſhall alſo be equal to Cc; if therefore Cc be ſubſtituted in place of Aa and Bb, the ſum of the actions ſhall be $A \times Cc + B \times Cc$; but this alſo is the ſum of the abſolute forces multiplied into the velocity of their common centre of gravity, and therefore they are equal.

Caſe 2. If the velocities are unequal, let Aa be leſs than Bb; draw the line ae, parallel to AB, cutting Cc in f; Aa, Cf, Be ſhall be equal, which call v. Let $fc = x$, and $eb = z$, hence Cc ſhall be $= v + x$, and $Bb = v + z$; The ſum of the actions ſhall be $Av + Bv + Bz$, and the ſum of the abſolute forces multiplied into the velocity of their common centre of gravity ſhall be $Av + Bv + Ax + Bx$; which two laſt we contend are equal.

From the definition of the centre of gravity $ac : cb :: B : A$, and by compoſition $ac : ac + cb$, that is, $ab :: B : B + A$; but (becauſe of the ſimilar triangles afc, aeb) $x : z :: ac : ab$; therefore $x : z :: B : B + A$; hence $Bz = Ax + Bx$; and therefore $Av + Bv + Bz = Av + Bv + Ax + Bx$, that is, the ſum of the actions of the agents A and B is equal to the ſum of their abſolute forces, multiplied

into the velocity of their common centre of gravity.

Caſe 3. If the number of agents be greater than two; let them be ſuppoſed three. By *Caſe* 1. and 2. the ſum of the actions of two of them is equal to what would ariſe, did both coaleſce in one, and move with the velocity of their common centre of gravity. Hence the number of agents are reduced to two, and conſequently fall under what has been above demonſtrated. By the ſame way of proceeding, 3, 4, 5, or any given number of agents, may (without altering their joint force or action) be ſuppoſed to coaleſce and move with the velocity of their common centre of gravity; and therefore, univerſally, the ſum of the actions of any number of agents, conſpiring to act in parallel lines, is always as the ſum of their abſolute forces multiplied into the velocity of their common centre of gravity. Q.E.D.

COROLLARY.

Action and reaction being equal, it follows, that the total reſiſtance of any number of powers reſiſting in parallel directions, is always as the ſum of their abſolute reſiſting forces (whether ariſing from attrition, coheſion, weight, attraction, or any other cauſe) multiplied into the velocity of their common centre of gravity.

THE

THEOREM.

The ſtrength of bones, whether ſolid or hollow, that is, the force whereby they reſiſt being broken tranſverſely, is as the area of their tranſverſe ſection, multiplied into the diſtance of its centre of gravity, from the centre of revolution or fulcrum on which the bone is ſuppoſed to be broken.

DEMONSTRATION.

The abſolute force whereby bones reſiſt being broken tranſverſely, is the power of coheſion uniformly diffuſed over the whole cohering ſurface: And this power of coheſion is compounded of all the powers exerted in every point of that ſurface: But theſe powers reſiſt in parallel directions (being all perpendicular to the tranſverſe ſection of the bone), with velocities proportional to their diſtance from their centres of revolution: And therefore, (by preceding *Cor.*) the ſtrength of the bone, or total reſiſtance of all theſe powers, ſhall be as their ſum multiplied into the velocity of their common centre of gravity, that is, as the area of the tranſverſe ſection of the bone, multiplied into the diſtance of its centre of gravity, from the fulcrum or centre of revolution. Q. E. D.

Cor. 1.

In comparing the ſtrength of bones, if the areas of their tranſverſe ſections are to one another

other reciprocally as the distances of the centres of gravity of those sections, from their centres of revolution, the bones shall be of equal strength; and, contrarily, if the bones are of equal strength, the areas of their transverse sections, and the distances of their centres of gravity, from the centres of revolution, shall be reciprocally proportional.

Cor. 2.

In comparing the strength of bones: If the areas of their transverse sections are equal, their strength shall be as the distances of their centres of gravity from their centres of revolution; and if those distances are equal, their strength shall be as the areas of their transverse sections.

Cor. 3.

Since the centre of circles co-incides with their centre of gravity, the strength of bones, whether solid or hollow, whose transverse sections are circles or annuli, shall be as the areas of those sections and their radii jointly.

Cor. 4.

The diameters and peripheries of circles being as their radii, their strength shall also be as the areas of their transverse sections and peripheries, and as the same areas and diameters jointly.

Cor.

Cor. 5.

Circles being to one another as the ſquares of their diameters, and conſequently as the ſquares of their radii and peripheries; it follows, that, in ſolid bones, whoſe tranſverſe ſections are circles, their ſtrength is as the cubes of their diameters, of their radii, and of their peripheries.

Cor. 6.

Similar figures being to one another as the ſquares of their homologous ſides; the ſtrength of bones, whether ſolid or hollow, whoſe tranſverſe ſections are ſimilar, muſt be as the ſquares of the homologous ſides of theſe ſections, and the diſtances of their centres of gravity from the centres of revolution jointly.

Scholium.

In hollow bones, whoſe tranſverſe ſections are ſimilar, their ſtrength muſt alſo be as the ſquares of their thickneſs, taken at ſimilar points of their tranſverſe ſections, and the diſtances of their centres of gravity from the centres of revolution jointly.

For the lines C*x*, *cx*. H*z*, *hz*, &c. (*See Tab.* 1. *Fig.* 9, & 10.) meaſuring their thickneſs at ſimilar points, become homologous ſides of the reſpective ſections, which are here to be conſidered as figures returning into themſelves at theſe lines C*x*, *cx*. H*z*. *hz*. &c.

Cor. 7.

The ſtrength of bones, whether ſolid or hollow, whoſe tranſverſe ſections are ſimilar, muſt alſo be as the ſquares of the perimeters of their tranſverſe ſections, and the diſtances of their centres of gravity from their centres of revolution jointly.

For (*See Tab.* 1. *Fig.* 9, & 10. 11, & 12.) if the areas of their tranſverſe ſections are called Z^2, z^2. and the diſtances of their centres of gravity from their centres of revolution are called D, $dZ^2 : z^2 :: ABq : abq :: BCq : bcq :: CDq : cdq :: DEq : deq :: EAq : eaq$. Hence $Z : z :: AB : ab :: BC : bc :: CD : cd :: DE : EA :: EA : ea :: AB + BC + CD + DE + EA : ab + bc + cd + de + ea$; therefore $Z^2 : z^2 :: \overline{AB+BC+CD+DE+EA}q :: \overline{ab+bc+cd+de+ea}q$; but the ſtrength of bones has been demonſtrated to be as $Z^2 : z^2 +$ as $D : d$, and conſequently their ſtrength muſt alſo be as $\overline{AB+BC+CD+DE+EA}q : \overline{ab+bc+cd+de+ea}q +$ as $D : d$.

Scholium.

From the like way of reaſoning it follows, that in hollow bones their ſtrength ſhall alſo be as the ſquares of the perimeters of their cavity meaſured on their tranſverſe ſections.

For (*Fig.* 9, 10.) the lines HI & *hi*. IF & *if*. FG & *fg*. GH & *gh*. may be conceived as homologous ſides of the reſpective ſections, which muſt

must here be considered as figures recurring on themselves in the lines *Hz*, *hz*.

Cor. 8.

In comparing the strength of bones whose transverse sections are similar, if right lines are drawn from the centres of gravity of these sections to similar points of their perimeters, (which we shall call similar radii of gravity) their strength shall be as the squares of these similar radii, and the distances of the centres of gravity of their transverse sections from their centres of revolution jointly.

For in the figures OBCDEABO, *obcdeabo* (*See fig.* 9 & 10, 11 & 12.) the lines OB, *ob*, &c. drawn from their centres of gravity O, *o*, to similar points B, *b*, &c. may be conceived as homologous sides of the respective figures, which, in this case, are to be considered as figures returning into themselves at the lines OB, *ob*, &c.

Cor. 9.

If the right lines BO, *bo*, (*Fig.* 9 & 10, 11 & 12.) are produced to similar points K & *k*, their strength shall also be as the squares of these lines thus produced, that is, as the squares of the diameters of gravity of the transverse sections, and the distances of the centres of gravity of the same sections from their centres of revolution jointly.

This is demonstrated as *Cor.* 7.

Cor.

Cor. 10.

The ſtrength of bones, whoſe tranſverſe ſections are ſimilar, being by *Cor.* 8. as the ſquares of the ſimilar radii of gravity of theſe ſections, and the diſtances of their centres of gravity from their centres of revolution jointly, it follows, that, when they are to be broken ſimilarly, or, in other words, when the fulcrum or centre of revolution is placed in ſimilar points of the bones, their ſtrength ſhall be as the cubes of the ſimilar radii of gravity of their tranſverſe ſections.

For, in this caſe, the diſtance of the centres of gravity from the centres of revolution coincides with ſimilar radii of gravity.

Cor. 11.

The homologous ſides, perimeters, and ſimilar diameters of gravity of ſimilar figures being as their ſimilar radii of gravity, it follows, that, when bones of ſimilar tranſverſe ſections are to be broken ſimilarly, their ſtrength ſhall alſo be as the cubes of the homologous ſides, the cubes of the perimeters, and the cubes of the ſimilar diameters of gravity, of their tranſverſe ſections.

XI. *REMARKS on the Articulation, Muſcles, and Luxation of the* Lower Jaw; *by* ALEXANDER MONRO, *Profeſſor of Anatomy in the Univerſity of* Edinburgh, *and* F. R. S.

IT is now near two centuries ſince anatomiſts have been univerſally acquainted with all the principal parts belonging to the lower jaw: They have known that the condyles are covered with a ſmooth cartilage; that the jaw moves on theſe proceſſes which are received into a cavity of each temporal bone, immediately behind the root of the zygomatic proceſs: And ſome have ſaid, that the condyle of each ſide moves on the root of the zygoma. Nor have they been ignorant of the oblong moveable cartilage, which is concave in the middle on both ſides, and is interpoſed between each condyle and the temporal bone with which it is articulated, nor of the ligament that connects the parts of this articulation. They have likewiſe deſcribed eight muſcles that ſerve to raiſe the lower jaw, and all the other muſcles which are ſo fixed to this bone as to be capable of pulling it down.

Though this account ſeems to comprehend all the parts that deſerve to enter into a deſcription; yet I imagine the mechaniſm of theſe parts is not hitherto ſufficiently explained, authors having either overlooked ſome neceſſary circumſtances of the ſtructure, or obſerving too negligently the actions and motions performed here, and miſtaking the proper organs of them; I therefore ſubmit to your judgments to determine

mine whether the following remarks on the articulation and motion of the condyles, and on the actions of some of the muscles of the lower jaw, with a short observation or two on the luxation of that bone, and the manner of reducing it, deserve a place in your collection of Medical Essays and Observations.

Each condyle of the lower jaw is not articulated only with the cavity behind the zygoma, or only with the root of that process; but both the anterior part of the cavity, and the posterior part of the tubercle at the root of the zygoma, are covered with smooth cartilage for the jaw to move on, and the ligament of this joint is fixed into the circumference of these two surfaces. The share of the cavity covered with cartilage is small, but the ligament generally is spread over, and loosely connected by cellular membranes to a larger share of it backwards, and the large part, which still remains behind this, is filled externally with the parotid gland, which I have seen frequently resemble at this place the glands commonly called *conglobate* in its firmness and smoothness, but never could separate this part from the rest of the gland without violence. In the remaining share of the cavity, immediately before the styloid process, a fat cellular substance is lodged.

The exterior extremity of this oblong posterior cavity is made very narrow by the *meatus auditorius externus* being considerably advanced forwards here, which again prevents the condyle ever to be pushed so far back, as to be in hazard of doing any injury to the gland situated in the more internal part of the cavity.

The

The ligament which riſes from the circumference of the ſmooth ſurface of the temporal bone, is conſiderably long and wide, and is inſerted into the edge of the concave moveable cartilage; from which edge another ligament goes out to ſurround the condyle of the jaw, and to be inſerted into the neck of that bone: This laſt ligament is more tightly connected to the cartilage and bone than the former.

Each condyle of the jaw-bone ſtands with its greateſt length tranſverſely, but with a ſmall degree of obliquity, the external extremity being a little farther advanced forwards than the other. It is alſo worth while to obſerve, that the convexity of this proceſs is not perpendicular to the neck of the bone, but is almoſt turned entirely forwards, where it is covered with cartilage for the articulation, while the neck and poſterior ſurface of the condyle, appear in one ſtraight flat ſurface, with very little cartilage covering the upper part of it.

Into the anterior edge of the moveable cartilage interpoſed between each condyle and temporal bone, a conſiderable ſhare of the external pterygoid muſcle is ſtrongly inſerted, and ſome few fibres of the temporal and maſſeter muſcles are alſo fixed to the external and ſuperior part of this cartilage. Dr. Douglas * is the only author I know who has ſo much as hinted this inſertion of theſe muſcles.

For better underſtanding the preceding deſcriptions, I have herewith ſent you a figure repreſenting the parts deſcribed in their natural ſituation and magnitude. See *Tab.* II.

When

* Myograph. chap. 20. & Append. p. 8.

When the teeth of both jaws are oppoſite, each to theſe of the ſame claſs, the condyles of the lower jaw are, in moſt men, placed in the cavity of each temporal bone; but, as ſoon as the teeth of the lower jaw are advanced forward beyond the range of the ſuperior, the condyles deſcend on the tubercles. This any one can be ſenſible of in himſelf, by laying his fingers on the angles of his own jaw, while he performs theſe motions; and it is obvious to the ſight when the articulation is laid bare by diſſection, and the bone is moved in the manner mentioned.

The condyles can be moved laterally, when they are lodged in the cavities, or on the tubercles; but theſe lateral motions are much more confined in the cavities, becauſe of the ſurrounding brims. Theſe facts are to be examined in the ſame way as the former.

The lateral motions, and thoſe backwards and forwards of the lower jaw, being exceedingly neceſſary for us in chewing, this mechaniſm of a double ſort of articulation in a cavity, and on a protuberance, anſwers the deſign much more effectually than any one uniform ſurface could have done, whether we ſuppoſe it plain, convex, or concave; for, in any of theſe, the motion neither could have been ſo gradual, nor ſo ſteady, and, at the ſame time, ſo free and large. But, without the interpoſition of a doubly-concave cartilage, the motion of the condyle on the tubercle would have been vacillating and often dangerous, ſeeing the two convexities could only touch each other in one ſtraight line; and therefore the condyle would have ſlid off, either

either back to the cavity again, or forward to occaſion a luxation: Whereas the cartilage, when placed on the tubercle, renders the ſurface on which the condyle is to reſt really concave, and exactly fitted to the convexity of that proceſs. If, however, this cartilage was to remain always in the ſame ſituation in reſpect of the condyle, it would be unneceſſary, if not inconvenient, when this proceſs is lodged in the cavity; therefore the cartilage is never preſſed farther back than the poſterior ſurface of the tubercle, and there it receives the anterior convex ſurface of the condyle; but while the cartilage is on the lower part of the tubercle, only the ſuperior ſtraight part of the condyle is joined to it. This is evident on performing theſe motions, after the joint is laid bare, and part of the ligament which goes between the condyle and the moveable cartilage is cut.

The ſurface of both condyle and cartilage is ſo ſlippery, the anterior edge of the cartilage is ſo little prominent, and the anterior part of the ligament connecting the two is ſo looſe, that the preſſure of the condyle on the cartilage would not be ſufficient to bring the cartilage as quickly forward as the condyle, which however I have endeavoured to prove is neceſſary; to prevent therefore the inconveniencies that might ariſe from the condyle's being immediately contiguous to the tubercle, ſome of the muſcles, which ſerve to move the condyle forwards, are alſo inſerted into the cartilage, and will equally advance both, and as the *external pterygoid* muſcle has the moſt direct action this way, and indeed the largeſt ſhare

in performing this motion, it has the greateſt number of fibres inſerted into the edge of the cartilage.

If the mouth was opened while the condyle ſtands on the tubercle, the flat back-part of the condyle would be applied to the cartilage, the anterior prominence of which would conſequently have little effect in preventing the condyle to ſlip forward: So that, if the leaſt force was employed at the ſame time to pull or puſh the jaw forward, a diſlocation would inevitably happen. To prevent which the muſcles that open the mouth are ſo ſituated, that, when they act, they muſt alſo pull the jaw backward: Hence when one attempts to open his mouth, while the under teeth are advanced beyond the upper, he immediately is ſenſible of the jaw's ſliding back; and no diſlocation does happen, without an external force applied, unleſs when the raiſers of the jaw, by a convulſive contraction, as in yawning or violent vomiting, do forcibly keep the jaw forwards, in the time that the depreſſors are acting.

All the forces ſaid to be employed to bring the lower jaw down in opening of the mouth, are the weight of the jaw itſelf, the action of the *platyſma myoides*, and of the digaſtric muſcles; but, as the two firſt are commonly allowed to be of little account, authors generally mention the digaſtric muſcles to be the ſole antagoniſts to the eight muſcles that raiſe the jaw; which I have long ſuſpected to have been aſſumed without ſufficient examination, there being ſome obvious appearances that would ſeem to infer an incapacity in theſe digaſtric muſcles, to

open

open the mouth so wide, and with such force, as we really see it is; such as,

1. The fleshy bellies of the digastric muscles would appear too short for performing such a large contraction, as is often required, whether we allow, according to the common way of reckoning, each fleshy fibre to contract $\frac{1}{7}$ of its length, and still less, if with Bernouilli * we restrict such contraction to $\frac{1}{3}$ of the length of the fibre.

2. The proportional force of the digastrics, to that of the levators of the jaw, is considerably less than what is commonly observed in other parts of the body, where antagonist muscles are; which proportional force of these muscles is, on some occasions, greatly lessened by the angle of insertion of these digastric muscles into the jaw, decreasing as the mouth is opened.

These suspicions made me to enquire more exactly into the structure of the parts, and to try some experiments which seem all to contradict the common opinion: For,

3. There is no pulley the least a kin to that of the larger oblique muscle of the eye, through which the tendon of each digastric muscle passes; but what is commonly called the ligament connecting the tendon of the digastrics to the *os hyoides*, is nothing else than part of the proper tendinous fibres of the digastric muscle, sent off from the rest in form of an aponeurosis †, which is fastened to the *os hyoides*, and is in part spread over the inferior extremity of the mylohyoideus muscle, to be uni-

* Act. Petropolit. Tom. 1.

† See Cowper's Myot. Tab. XXIII.

ted to such another aponeurosis of the other side; and the connexion of this aponeurosis, as it comes off from the round tendon, is so firm, that the least shuffling or motion of the round tendon within this ligamentous sheath, as it is commonly called, is not allowed: But, this aponeurosis being of some length, it can yield a little backward or forward when one or t'other of the fleshy bellies of the digastric muscle is shortened. Since then there is no sheath in which the middle tendon can slide, but that on the contrary it is connected to the *os hyoides*, we may see the unfitness of the posterior heads of the two digastric muscles for pulling the jaw down.

4. That we may have ocular conviction of the posterior belly of the digastric having no effect on the lower jaw, let it be laid bare in a dead body, whose head must be reclined back for this purpose, and then pull this muscle in the direction of its fibres, while the *os hyoides* is kept firm, or a little brought down (which this bone evidently is, when the mouth is opened) the jaw will not in the least be moved. If the *os hyoides* is left unfixed while the muscle is pulled, that bone is brought upwards, till the two heads of the digastric are brought to form a straight line, after which indeed the force applied to the posterior belly of the muscle begins to depress the jaw. But, as the first case of the *os hyoides* being kept firm, is the only supposition to be allowed in the present question, I presume this conclusion from the foregoing observations will scarce be refused: That the common account of the action of the digastric

ſtric muſcles is not altogether ſo unexceptionable as it has hitherto paſſed for.

Having undone the mechaniſm of a pulley, through which the middle tendon of each digaſtric is ſaid to paſs; and having excluded the poſterior head of that muſcle from its office of pulling the jaw-bone down; I am almoſt induced to think, that, in the ordinary depreſſions of the lower jaw, the anterior bellies of the digaſtric muſcles are as little employed as the poſterior: For,

5. When the two extremities of this anterior head are pulled towards the middle by the help of a thread paſſed through the firm tendinous part near each extremity, the ends of which are croſſed, and equally drawn in the direction of the fibres, which is the faireſt way of knowing the action of any muſcle, both whoſe extremities are moveable; when, I ſay, the anterior head of the digaſtric muſcle is pulled in this manner, we obſerve the tendinous aponeuroſis yield near as much forwards as one would expect the natural contraction of this fleſhly belly would require. When the aponeuroſis is fully ſtretched, the *os hyoides* is brought upwards, and then the jaw-bone is pulled down. If the *os hyoides* is kept firm, while this muſcle is thus drawn, its effects on the lower jaw will be greater and more obſervable. And, if the poſterior head is alſo pulled at the ſame time, the whole effort of the force wherewith the anterior belly is drawn, is employed in opening the mouth. From which it would appear, that, in order to apply the power of this anterior muſcular head to the jaw-bone, it is

neceſſary to ſuppoſe the poſterior belly to act at the ſame time with it, that the aponeuroſis may be kept ſtretched, which is all the ſervice this poſterior head does; and, in performing this, it muſt exert a force equal to the contraction of the anterior belly; and that force muſt be employed in the direction of its muſcular fibres on the *os hyoides*, and therefore muſt counteract the muſcles which pull the *os hyoides* down; but I ſhall afterwards prove that the action of theſe laſt muſcles is conſtant and neceſſary in opening of the mouth; conſequently the jaw gains nothing on this ſuppoſition of the anterior belly of the digaſtric aſſiſting the depreſſion of it, ſince an equal power is loſt by the action of the poſterior head. From all which there is at leaſt a ſeeming improbability of any part of the digaſtric muſcle acting in the depreſſion of the jaw, when nothing is to be gained by it.

6. To confirm what has been argued for in the preceeding paragraph, let any one whoſe *tunica celluloſa* is not too well filled, apply his fingers to the teguments that cover the anterior heads of the digaſtric muſcles, while the mouth is opened ever ſo wide, quickly, or ſtrongly, he will indeed feel theſe muſcles protruded a little outwards, by the ſwelling of thoſe above them; but will not be ſenſible of their becoming either harder or ſhorter, which however is plainly to be felt at this ſame time in much thinner muſcles, the ſternohyoidei and ſternothyroidei, by placing another finger on the forepart of the *trachea arteria*; and is manifeſt

manifeſt in theſe ſame anterior heads of the digaſtrics, when deglutition is performed.

The office I would aſſign to the digaſtric muſcles is to be principal inſtruments in the compound action of deglutition, one part of which they are exceedingly well adapted to perform, which is to pull the *os hyoides* upwards, and thereby to preſs the root of the tongue, *&c.* to the *velum pendulum palati*; for which purpoſe the only organs commonly mentioned, the *ſtylo-hyoidei*, *ſtylo-gloſſi*, and perhaps the *ſtylo-pharyngei* muſcles are too weak, conſidering the reſiſtance they muſt meet with, in raiſing ſo many parts, *viz.* the tongue, *os hydes*, *larynx*, &c. whoſe muſcles are to be ſtretched far beyond their natural tone. The fitneſs of theſe digaſtrics for ſuch an office is pretty evident from a view of theſe muſcles in their natural ſituation, and only applying the univerſally acknowledged effort of all muſcles, to bring themſelves in their contractions from a crooked to ſtraight ſtate. For further evidence, let both heads of either one or both digaſtric muſcles be pulled in the manner formerly mentioned, and the raiſing of the *os hyoides* will be ſeen: Or, what may perhaps be as convincing, let any one ſwallow either ſolids or fluids, while his fingers are applied below his chin, and he will feel the ſwelling, hardneſs, and ſhortning of theſe muſcles then in action.

Mr George Lauder, ſurgeon in this place, having diſſected away a tumor covering one of the digaſtric muſcles, cauſed the patient to drink while the muſcle was laid bare; when he, and a numerous

numerous crowd of ſtudents in medicine, ſaw the muſcle perform its contractions violently every time that the patient ſwallowed the liquor; unluckily he neglected to deſire him to open his mouth wide and quickly.

This being granted to be the proper action of the two digaſtrics, we may readily aſſign ſeveral reaſons why one can ſcarce ſwallow any with his mouth open: Firſt, The lower jaw being then unſtable and moving, theſe muſcles have not ſuch a fixed point to reſiſt their actions. Next, The jaw and *os hyoides* being brought nearer, the curve made by the tendon of each digaſtric muſcle muſt be diminiſhed, conſequently the effect the muſcle would have on the *os hyoides* is alſo leſſened; whereas it ought rather to have been increaſed, becauſe the ſpace between the *velum pendulum palati* and the *os hyoides* is increaſed, by this bone's being brought down at this time. Laſtly, the muſcles which ſerve to draw down the *os hyoides* being now in contraction, they muſt prevent the action of the digaſtrici.

We may here alſo obſerve how advantageouſly the tendinous aponeuroſis of the digaſtric muſcles are ſtretched over the mylohyoidei muſcles, for raiſing the root of the tongue along with the *os hyoides*; and how the ſtylohyoidei and digaſtric muſcles may act more uniformly and in more convenient direction, by the tendons of the latter paſſing through the ſubſtance of the former.

I come now to ſupply the function which I have endeavoured to deprive the digaſtric muſcles of; but muſt previouſly remark, that the opening of

of the mouth does not only depend on the motion of the lower jaw downwards, but alſo on the ſuperior jaw being raiſed up by the muſcles which extend the head back: This fact is ſtrongly denied by the generality of anatomiſts, and really paſſed unobſerved by me, till my ingenious friend, and *quondam* pupil, Dr John Pringle, made me remark it; and any one may convince himſelf of the truth of it, by putting the blade of a knife, or his own nail, oppoſite to the conjoined edges of the teeth when the mouth is ſhut; which knife being held unmoved while the mouth is opened, he may, by the help of a mirrour, ſee the upper teeth raiſed remarkably at every apperture he performs. The larger ſhare however of the mouth's apperture is, in the ordinary erect poſition of the head, made by the lower jaw's being brought down by muſcles that are commonly appropiated to the tongue, *os hyoides*, and larynx, which are capable, in my opinion, of being applied not only to this uſe, but to ſome others that are generally overlooked.

In conſidering theſe muſcles in reſpect of the lower jaw, imagine the *ſterno-hyoidei* and *genio-hyoidei*, or the *coraco-hyoidei* and *mylo-hyoidei* to act at the ſame time; it is evident, that the *ſternum* and *ſcapula* being fixed in compariſon of the jaw, theſe muſcles may be looked on as digaſtrics, whoſe middle interſection is the *os hyoides*, and whoſe moveable inſertion is the lower jaw. Imagine in the ſame manner the *ſterno-thyroidei*, *thyro-hyoidei*, *hyoglooſſi* and *geniaglooſſi* to act all together, they

they may be considered as too many-bellied muscles acting on the lower jaw, which they will be sufficient depressors of in length, strength, and manner of insertion, without standing in need of assistance from any other muscles. Besides what might reasonably be deduced from viewing these muscles, and from pulling them in the direction of their fibres in a dead body, in proof of their being employed in depressing the jaw, we can be abundantly sensible of most of them acting when the mouth is opened, by laying our fingers on the teguments that cover them.

These muscles do, by the jaw's descending, lose somewhat of the advantageous insertion which they have when the mouth is shut; for the *os hyoides* will descend so much less than the jaw-bone, as the contraction of the muscles situated below the *os hyoides* is less than the joint contraction of these muscles, and of the others that go from that bone to the jaw: To mention an example, suppose the *sterno-hyoidei* and *genio-hyoidei* only to act, the chin will be brought proportionally so much farther down than the *os hyoides* descends, as the quantity of contraction of both *sterno-hyoidei* and *genio-hyoidei* is greater than the contraction of the *sterno-hyoidei* alone; in consequence then of the chin being brought nearer to the *os hyoides*, the muscles between these two bones come to have a more oblique direction to the jaw, or to have their angles of insertion diminished, and their force in pulling the jaw down lessened on that account: One advantage however is hereby obtained, that the root

of

of the tongue, *larynx*, &c. are not removed too far out of their place; and that loſs of advantageous inſertion is compenſated another way; for, when the muſcles above and below the *os hyoides* are conſidered as digaſtrics, it is evident that this bone being placed farther back than the inſertion of the muſcles into the jaw, a conſiderable curve muſt be made at this bony interſection of theſe muſcles; and therefore, by becoming ſtraighter in their contraction, they muſt draw the *os hyoides* forward, by which this bone becomes more perpendicular to the jaw, and the muſcles obtain neceſſarily a more favourable direction. But, in all poſitions of the *os hyoides* in reſpect of the jaw, the obliquity of the muſcles backward is great enough to oblige the condyles of the lower jaw, when advanced on the tubercles, to ſlide back into the cavities in the time of their action, by which, as I hinted formerly, luxations are prevented.

This motion of the *os hyoides* forwards and downwards, which can be felt by laying a finger on this bone when the mouth is opened, leads us naturally to account for the uſe of the ligament which is ſent out from the ſtyloid proceſs of each temporal bone to be fixed to each appendix of the *os hyoides*; for its direction is exactly ſuch as prevents this bone to be drawn too far out of its place by the muſcles that open the mouth; whereas it can be of little effect towards ſupporting the *os hyoides* and other parts connected to it, unleſs it had been more perpendicular. I imagine the reſiſtance which theſe ligaments make to the muſcles

muſcles below the *os hyoides*, to be one reaſon why theſe muſcles do not bring the *os hyoides* ſo far down proportionally to their lengths, as the others above it ſeem to depreſs the jaw, in opening the mouth. Which action I found to be performed by the ſeveral parts concerned in the following proportion; by ſtraining I can open my mouth, when the head is in the moſt natural eaſy poſition, till the diſtance between my anterior *dentes inciſores* is $1\frac{1}{2}$ inch, to which the extenſor muſcles of the head contributed ſomewhat leſs than half an inch by raiſig the upper jaw, the *os hyoides* deſcended about as much more than half an inch as the upper jaw wanted of it, and conſequently the muſcles between the lower jaw and *os hyoides* contracted one third of the whole ſpace I choſe this ſtraining poſture, becauſe any other degree of opening the mouth cannot well be determined; but I am at the ſame time ſenſible, that, where no ſuch violent contraction of muſcles is required, the proportional motions of theſe parts will be different from what I have juſt now deſcribed them; and, when the head is extended very far back, the lower jaw only is moved in opening the mouth, whereas this action is chiefly performed by raiſing the upper jaw when the head is bended much forward.

Suppoſing then the *mylo-hyoidei*, *genio-hyoidei*, *genio-gloſſi*, *hyo-gloſſi*, *ſterno-hyoidei*, *coraco-hyoidei*, *thyro-hyoidei* and *ſterno-thyroidei* muſcles always to be employed in drawing down the jaw conjunctly, (whereof however in ordinary occaſions ſome may be unactive) the force

force they are capable of exerting will be considerably less than that of the levators. From thence we may learn how the whole parts being left to their natural action, the lower jaw may be supported and the mouth kept shut by the superior power in the levators; whereas the depressors in their voluntary contraction (which is vastly greater in all muscles than the natural) may be capable of overcoming the natural force of the levators: Hence also we may see the reason of the jaw's falling down by its own weight, when the natural contraction of all the muscles is weakenad by palsy, drunkenness, or sleep; or how, on the contrary, the mouth is violently kept shut, when the muscles are preternaturally contracted, as in convulsions, inflammations, &c.

These muscles which are so well adapted for depressing the lower jaw are capable of performing very different functions when the lower jaw is kept firm by the muscles which raise it. If they act at different times, the most remarkable of their actions will be these; the *genio-glossi*, *hyo-glossi*, *genio-hyoidei* and *mylo-hyoides* will pull the *os hyoides* and tongue upwards and forwards. If with these the thyro-hyoidei act, the larynx will also be brought along with the other parts; if with all yet mentioned the sterno-hyoidei and coraco-hyoidei act, the larynx only will be brought nearer to the *os hyoides*. If the thyro hyoidei alone act, the *os hyoides* and thyroid cartilage will approach each other proportionally to their mobility. If the sterno-hyoidei and caraco-hyoidei act with the former, the *os hyoides* will descend to the

cartilage. If to these the sterno-thyroidei are joined, then the tongue, *os hyoides*, and larynx, will be brought down. All the other combined actions of these parts are easily deducible from these mentioned. If these muscles act all together, and the jaw is kept firm at the same time by its levators, they have an effect not so generally remarked, which is the bending of the head forward, the articulations of the head and of the superior vertebræ being the nearest moveable joints; and, in this action, these muscles must have very great advantage by the great distance of their insertion from the centre of motion; or, in other words, by the length of the vectis they act with: As an evidence of the fact, let any one's head be pulled or pushed violently backward, his jaws are pressed strongly together, and his throat is tense with his larynx advanced, while he strains to resist the force applied: This the painters seem to have been abundantly more sensible of than the anatomists.

The sum of all I have argued for, concerning these muscles, may be deduced in these few propositions.

The digastric muscles serve to draw up the *os hyoides* and parts annexed to it in deglutition.

In opening the mouth, the head is extended, and the whole muscles of any considerable length and bigness situated betwixt the sternum and chin (except the digastrici) are put into action, the *os hyoides*, *&c.* are drawn down and advanced forward; if the jaw-bone was brought forward, it is made to slide back.

When

When the mouth is kept ſhut, or the jaw-bone is made firm by its levators in any degree of the aperture of the mouth, that range of muſcles juſt now mentioned may either contract ſucceſſively, and then they act as commonly deſcribed, unleſs that, by being variouſly combined, they may be differently determined to pull up one part, or to depreſs another: Or, if all the muſcles act together, they conſpire to bend the head forward. See this ſubject treated at greater length, in Vol. III. Art. XIII.

When the condyles of the lower jaw are luxated, the mouth ſtands open and cannot be ſhut; this Mr Petit † aſcribes to the direction of the fibres of the muſcles that raiſe this bone, being ſo altered in reſpect of the condyles, that theſe proceſſes come to be ſituated in a ſtraight line drawn from the origin to the inſertion of the muſcles; and therefore theſe muſcles can have no other effect than to preſs the condyles cloſer to the temporal bones: It is evident however that this cannot obtain in moſt of theſe muſcles; as, for inſtance, in the maſſeter and internal pterygoid, nay, the external pterygoid would ſeem to gain as much more in this morbid ſituation as the temporal loſe; and I have ſeen people labouring under a luxation of the lower jaw, whoſe mouth ſtood open to a certain degree, but they could ſtill open it farther, and bring it back again by the elevator muſcles of the jaw. The plain cauſe of the mouth's not ſhutting in the luxation is the ſlipping of the coronoid proceſſes

† Maladies des os l v. 1. chap. 2.

under the anterior root of the zygoma, and their being preſſed on that bone; which is, I ſuppoſe, one reaſon why, after attempting the reduction of ſuch a luxation, by ſimply preſſing, or ſtriking the fore-part of the jaw upwards; or, after applying any other force that preſſes the coronoid proceſſes violently upon the bones of the upper jaw, a tenſion and inflammation may be brought on the parts hereabouts, and particularly on the temporal muſcles, which afterwards may be followed by all the other ſymptoms of a pricked, bruiſed, or wounded tendon taken notice of by Hippocrates, becauſe the tendon of the temporal muſcle of the luxated ſide muſt ſuffer theſe very injuries, by being intercepted betwixt the corone and the *os maxillare* or *maxillarum*.

This cauſe of the mouth's remaining open in a luxation which I have aſſigned, was the common reaſon given for it before Mr Petit, and is ſtrenuouſly defended by one of his critics †; therefore I need not have mentioned it, if Mr Petit's book was not in the hands of a great many young ſtudents here, and the other known to few; and I hope the other circumſtances added, which are at leaſt not ſo commonly remarked, will plead my excuſe.

I have more than once found Mr Petit's method of reducing the luxated jaw-bone ineffectual, after the muſcles had been ſwelled by unartful attempts of reduction, but have ſucceeded

† Diſſertation au ſujet des ouvrages de l'auteur du livres ſur les maladies des os.

ceeded by a very small improvement on that excellent method, which was to wrap linen so thick round my two thumbs, that I could scarce introduce them betwixt the posterior grinders; then taking hold of the base of the jaw with my fingers, and applying my palms under the chin, I pressed down and pulled forward the posterior part of the jaw with my fingers and the points of my thumbs, which is the whole of Mr Petit's method; and, at the same time, I thrust the anterior part of the jaw upwards with my palms, so that the jaw being made use of as a lever to which the last joint of the thumbs served as a prop, I acquired a considerable additional force, to which the muscles were obliged to yield, and the condyles were disengaged entirely from the zygoma, and brought down, after which they slide backwards with the least assistance, and the reduction is fully made.

When the thumbs employed, as just now described, have not force enough to make the reduction, my friend Dr Simpson, professor of medicine at St Andrew's, makes use of a round piece of wood eight or nine inches long, one end of which is cut into the form of a wedge, to introduce it between the teeth of the luxated side with the thinnest part as far back as the posterior grinders, when, having the head secured and raising the chin, he pushes the other end of the wood upwards to depress the back part of the jaw with the thin end, by which the force is much greater than the thumbs can exert.

THE origin and courſe of the CHORDA TYMPANI being deſcribed by few authors, and ſcarce delineated by any in the natural poſition, and the figure eaſily admitting of the repreſentation of the inferior maxillary branch of the fifth pair of nerves, as it comes out of the ſkull, and divides into its branches, I have cauſed that nerve, and the *chorda tympani* to be painted, which I ſhall ſay, with the generality of anatomiſts, proceeds, or is ſent off from that nerve, though I rather incline to think it a branch of the *portio dura* of the ſeventh pair united to the fifth. The *chorda tympani* takes its origin moſt frequently from that branch of the fifth pair that is beſtowed on the tongue; but I have ſeen it ſometimes riſe from the trunk which furniſhes the branch given to the tongue, and the other that enters the poſterior hole of the lower jaw. The chorda immediately after its riſe runs backwards and outwards, involved in a cellular ſubſtance, till it ſinks within the bony part of the *tuba Euſtachiana*: The ſituation of the ſkull in drawing this figure would not allow me to delineate more of this chord, without deſtroying ſome parts that were chiefly deſigned to be illuſtrated here; wherefore I ſhall refer to *tab.* xiii. and vii. of *Du Verney's traitè de l'organe de l'ouie* for what remains of it; and ſeeing our common ſyſtems, nay the authors who have expreſsly treated of the nerves, paſs the deſcription of this nerve generally very ſlightly, I ſhall tranſlate Mr Du Verney's deſcription, which is the fulleſt and moſt exact I know.

"The

"The little nerve (says he, page 51.) that "croſſes the tympanum, has its origin imme- "diately from the branch of the fifth pair of "nerves, which deſcends to be diſtributed to "the ſide of the tongue; this little nerve a- "ſcends to the exterior ſide of the bony part "of the *tuba Euſtachiana*, and following the "courſe of the external (commonly called now "the oblique) muſcle of the malleus over which "it lies, it enters by the ſame aperture into "the tympanum; then it paſſes under the ten- "don of the internal muſcle, and, deſcending "obliquely from before backwards, it lies up- "on the membrane of the tympanum, and paſ- "ſing before the long leg of the incus, it at "laſt eſcapes out of the cavity of the tympa- "num, to enter into a ſmall canal formed in "the *os petroſum*, and is joined to the *portio* "*dura* of the auditory nerve, a little before "the *portio dura* makes its exit from its ca- "nal."

The only remark I have to make on this de- ſcription is, That I am at a loſs how to under- ſtand the words, *It lies upon the membrana tympani* *; for it does not appear to be imme- diately contiguous to that membrane.

I have alſo cauſed the *tubæ Euſtachianæ* to be repreſented in this figure, in full view, that one, by ſupplying in his imagination the *velum pendulum palati* and *uvula* depending oblique- ly from the edge of the palate bones, or by conſulting Du Verney's *tab.* IX. *fig.* 2. may ea- ſily underſtand the true ſituation of the orifices of the tubæ, which ſome anatomiſts ſeem not to

* Il ſe couche ſur la peau de tambour.

to be entirely well acquainted with, though it is an anatomical fact neceſſary to be exactly underſtood, eſpecially if it ſhall be found, that the method of injecting medicines by this canal for curing deafneſs in ſeveral caſes ſhall prove ſucceſsful, which there is a great probability it ſhould; and of which Mr Guyot gives a good inſtance, by relating his own cure*. The inſtrument he made uſe of for injecting the medicines is deſcribed at great length, by Mr Garengeot, in his treatiſe of *chirurgical inſtruments*.

By authors neglecting to explain the method they took to repreſent the parts delineated in their figures, diſengaged from all the others to which they are naturally contiguous and adherent in the body, I have often obſerved younger anatomiſts utterly at a loſs to ſearch out the parts which they imagined they underſtood exactly the ſituation and ſtructure of, from the repreſentation authors had made of them. To prevent ſuch an inconvenience in the preſent caſe, allow me to inform your readers how the bones appear ſo bare, and yet the ſofter parts which were deſigned to be repreſented are preſerved entire.

Mr Cooper, who both drew and engraved the following figure, not having been formerly in uſe to work on anatomical ſubjects, I put a ſkull perfectly cleaned in the proper attitude, and let him draw it at his leiſure; then I cauſed him to ſupply the other parts painted from the firſt recent ſubject I had afterwards, whoſe ſkull was very near of the ſame dimenſions, having

* Hiſt. de l'acad. des ſciences. 1724.

having previouſly made the bones as bare as I could without boiling or macerating, and without injuring the ſoft parts deſigned to be illuſtrated; which method has had a good effect, by making the whole figure more ſimple and beautiful.

Explication of Table II.

A. The occipital bone.
B. The lambdoid ſuture.
C. The great hole of the occipital bone through which the *medulla ſpinalis* paſſes.
D. D. The condyles of the *os occipitis*.
E. E. The maſtoid proceſſes of the temporal bones.
F. F. The ſtyloid proceſſes.
G. G. The zygomatic proceſſes.
H. H. The holes through which the lateral ſinuſes and eight pair of nerves paſs.
I. I. The paſſages of the carotid arteries.
K. K. The external wings of the pterygoid proceſſes of the ſpheroid bone.
L. L. The internal alæ.
M. M. The external ears.
N. The left temporal proceſs of the ſphenoid bone.
O. The back part of the vomer.
P. P. The part of the parotid glands lodged in the back-part of the cavities which receive the condyles of the lower jaw.
Q. Q. The *tubae Euſtachianae*.
a. The Tubercle of the left temporal bone

bone on which the condyle of the lower jaw moves when the maxilla is drawn forwards.

b, The cavity behind that tubercle wherein the condyle is commonly lodged. The surrounding ligaments hinder this cavity to be fully represented.

c. The ligament which connects the moveable cartilage to the temporal bone.

d. The moveable cartilage of the right side brought forwards on the tubercle that it might be fully seen.

e. The circular ligament which connects the cartilage to the condyle of the jaw.

f. That part of the external pterygoid muscle which is inserted into the moveable cartilage, and serves to pull it forwards.

g. *g*. The third branch of the fifth pair of nerves coming out of the skull.

h. *h*. The branches of that nerve given to the temporal and masseter muscles.

i. *i*. The *chorda tympani* sent off from the branch of that nerve which is distributed to the tongue.

XII. *An*

XII. *An Eſſay on the alternate Motions of the Thorax and Lungs in Reſpiration; by Dr* GEORGE MARTINE, *Phyſician at* St Andrew's.

NO compleat theory of reſpiration has been yet ſufficiently explained and fully eſtabliſhed: After all the ingenious contemplations and experiments of philoſophers anent the properties of the air; after all the moſt curious reſearches of anatomiſts, and the careful obſervations of phyſicians about the fabric, uſes, and diſeaſes of the parts concerned, there are ſtill left many difficulties, which I am far from pretending to remove; much has been wrote, many have been the diſputes about the primary uſe of reſpiration, about the paſſages of the blood through the lungs, about the influence of the inſpired air upon the blood, &c. But, all theſe being laid aſide at preſent, I ſhall only conſider the mechaniſm whereby, in ordinary life, expiration and inſpiration ſucceed one another alternately.

2. You will not be ſatisfied with Swammerdam's † telling you in general, That theſe muſcles, which are not exactly balanced by equally ſtrong antagoniſts, muſt neceſſarily be contracted and relaxed by turns; as, in the motions of the ventricles and auricles of the heart, of the reſpiratory muſcles, of the antagoniſts of wounded or paralytic muſcles, &c.

He

† De reſp. p. 67. & Poſ. Inaug. § 8. 9.

He does not offer at explaining the mechaniſm of the alternate contraction and relaxation of the muſcles in ſuch motions, which is the point in queſtion; nor is it probable that all theſe very different motions are to be explained by any one uniform principle.

3. Nor will you think Borelli † has given a perfect ſolution of the problem, by ſaying, That, after once reſpiration is begun, the animal, from the good it feels by it, is neceſſarily determined to continue the ſame all its life afterwards.

We allow the neceſſity of reſpiration; we know it ſerves for many noble purpoſes: But ſtill we are at a loſs to underſtand by what natural mechaniſm, exſpiration and inſpiration neceſſarily continue to ſucceed one another by turns.

4. We cannot omit to remark, that the great Bellini thought himſelf maſter of this difficult queſtion, as of almoſt every thing elſe relating to the nature and fabric of animals. In the beginning of his *opus medicum de urinis, &c.* he lays down ſeveral very pretty phyſiological propoſitions; among which is this ‡, "*Con-*" *tractis ſemel muſculis pectoris, per totum vi-*" *tae ſpatium reſpirat animal neceſſe eſt, iidem*" *ſcilicet muſculi per univerſum illud tempus al-*" *terne reſtituantur et contrahantur.*" This he gives us without any illuſtration or proof; and I fear we ſhall never hear more of that great man's thoughts on this ſubject. Nor does his friend,

† De mot. anim. II. 117.
‡ De reſp. § 18.

friend, our worthy countryman Dr Pitcairn, (who wrote his dissertation *de Causis diversæ Molis qua fluit Sanguinis per Pulmones*, &c. chiefly to illustrate Bellini) supply this want, or at all answer our wishes or expectation. He tells * us, after Swammerdam, That muscles without antagonists, such as he conceives the inspiratory muscles to be, must necessarily be contracted and relaxed alternately; and that, by the alternate influx of the animal spirits through the nerves into them, proceeding from the alternate compression of the brain, by the pulsation of its arteries.

By laying aside those reasons which induce some † to think the natural motion of the liquor of the nerves to be very uniform; if Dr Pitcairn's solution of the alternate dilatation and contraction of the thorax were true, I cannot see but that they should always correspond, and be isochronous to the pulses of the heart and arteries, which every body knows to be false in fact. Yea, though we should allow them in many cases to correspond in some measure, yet Dr Harvey ‡ has well observed, that the pulse and respiration do sometimes suffer changes of frequency, directly contrary to one another.

5. This consideration does likewise, I humbly think, very much invalidate the way wherein the judicious and accurate Boerhaave chuseth to explain the alternate motions of respiration.

* De caus. div. mol. &c. § 16. El. med. 1. 5. § 70.
† Boerh. inst med. § 288.
‡ De mot. cord. procem. p. 15.

He ſuppoſes *, that, at the end of inſpiration, the lungs being ſtuffed with air, and every way compreſſed, the free paſſage of the blood towards the left ventricle of the heart is ſomewhat obſtructed; and conſequently a ſmaller quantity is carried to the inſpiratory muſcles of the cheſt, and a weaker circulation towards the cerebellum and its nerves, which are ſuppoſed to actuate theſe muſcles: So that, the inſpiratory organs being weakened, exſpiration muſt of neceſſity ſucceed by the natural reſtitution of the compages of the thorax and abdomen; whence the blood, paſſing again more freely through the lungs to the left ventricle, will be the more plentifully beſtowed upon the cerebellum, and theſe inſpiratory muſcles, which then muſt of their own accord immediately dilate the cavity of the breaſt, or produce inſpiration, which exſpiration does neceſſarily ſucceed, and ſo on.

But, beſides the diſſonance of the motion of the heart and thorax juſt now mentioned, I believe it will be difficult to perſuade us that the diaphragm and intercoſtal muſcles ceaſe to contract for want of a ſufficient ſtore of blood furniſhed to the left ventricle of the heart, or for want of ſpirits furniſhed to the cerebellum and the vital nerves. Would not, upon the ſame account, all the other muſcles, whether voluntary or involuntary, and the brain itſelf, and all the nerves of ſenſe and motion, alternately ſuffer ſome failure (ἐκλειψιν) at the end of every inſpiration, from the diminiſhed quantity of blood ſupplied to the left ventricle, and thence

* Inſtit. Med. § 619. 620.

thence to the reſt of the body? Is not the beating of the heart and arteries equally full, equally ſtrong, and equally frequent at all the different moments of reſpiration? which plainly ſhews, that, in a ſound ſtate, the heart never wants blood, nor the cerebellum ſpirits to furniſh the organs that depend upon them: So that the inſpiratory muſcles, which are ſuppoſed to be vaſtly ſtronger than their antagoniſts, would always remain rigid and contracted, if there were not ſome other way provided to ſuſpend alternately the cauſe of their contraction.

6. Seeing then theſe ſo very great men had made their attempts with ſo little ſucceſs, I gave over thoughts of ſo much as an approach to any true and juſt account of a phænomenon ſo obvious, but ſo difficult to be explained; until at length, meditating upon the riſe and ſingular courſe of the nerves of the diaphragm, I thought I could perceive a neceſſity of their being alternately compreſſed, and again ſet at liberty, ſo as to produce an alternate contraction and relaxation of that muſcle.

Every body allows, that it is the chief organ of ordinary and natural reſpiration, ſince, from the ſwelling of the belly, we find the enlargement of the cavity of the breaſt is more owing to the depreſſion of the midriff, than to any remarkable change in the poſture of the ſternum and ribs. Now let us trace as far as we can, and admire the adorable wiſdom and contrivance of our great Creator. He has not provided the midriff with nerves from the trunks neareſt it, either from the *par vagum*, or that which is called *intercoſtal*, or the ſpinals of

the thorax or loins next to it: No, he has brought nerves to it from afar, and conveyed them a long courſe, through the cavity of the breaſt: For the phrenics, though they ſhould not be allowed in all ſubjects to be made up preciſely of the ſame twigs, yet anatomiſts have always found their chief origin from the middle cervical nerves. And I think we need not mind Vieuſſens's * ſmall filaments from the intercoſtal or firſt lumbars; or Columbus's † from the laſt thoracic given to the diaphragm. Much leſs are we to regard any branches of the eighth pair ſaid to be diſtributed to it by ſome of the ancients; ſince Galen ‡ aſſures us it has not the leaſt twig from thence. Why then has nature been ſo ſolicitous in giving the principal diaphragmatic nerves ſuch a far-fetched origin, and carrying them ſuch a long courſe? If you ſhall once perceive her deſign in this, I am hopeful you ſhall with pleaſure comprehend the alternate motion of reſpiration, as far at leaſt as it depends upon the motion of the diaphragm.

7. Firſt then, we are to conceive the external air gravitating equally *undequaque* by its weight and fluidity; and therefore preſſing upon the hollow ſurfaces of all the pulmonary veſicles, and conſequently upon the membrane inveſting the lungs, and incloſing all theſe veſicles: By the mediation of this coat of the lungs, that preſſure of the air ſhould be propagated to the membrane lining the thorax, which we commonly

* Neurog. T. xxiii. 58. T. xxviii. 1.
† De re anat. viii. 6.
‡ Diſſ. nerv. 10.

monly call the *pleura*. But now, at the end of exſpiration, the thorax being collapſed, conſider the natural contractility of all the membranes and fibres of animals, but eſpecially conſider the reticulated work of muſcular fibres ſurrounding the lungs, and every way pervading and ſtrengthening their ſubſtance *: Conſider theſe circumſtances, I ſay, and you will ſtraightway conceive how the contractile pulmonary membranes and fibres will, by their reaction, in ſome meaſure ſupport the action or preſſure of the inflating air; which therefore cannot preſs with its whole force upon the pleura; but the phrenic nerves run along the pericardium, covered very ſlightly by the pleura or mediaſtinum: So that in this ſuppoſed moment of time, at the end of exſpiration, the preſſure of the air upon theſe nerves muſt be leſs than upon the other parts of the body, to which the compreſſing force of the ſurrounding atmoſphere has a freer and leſs interrupted acceſs. Whence the liquor of the nerves, or whatever influence is communicated by them, muſt find a more free and eaſy paſſage to the midriff; whereby that muſcle begins immediately to contract itſelf; and by the enlargement of the thorax, inſpiration commenceth. During the courſe of which, theſe nerves continue rather freer from compreſſion, by the inflation of the lungs ſtretching more and more the contractile pulmonary fibres, which therefore do more and more ſupport the preſſure of the atmoſphere.

* Malpighii in Phil. Tranſ. 71. Abr. 12. p. 818 & Vit. poſth. p. 9.

8. So then, after exſpiration, we find inſpiration muſt neceſſarily ſucceed; which will continue until the thorax ſhall have acquired its ordinary enlargement, by the natural and ordinary depreſſion of the diaphragm. Then indeed the inſpired air, being rarified by the heat of the breaſt, and not finding a free enough exit by the narrow ſlit of the glottis, will preſs every way the containing veſicles and membranes of the lungs. Which preſſure therefore will be forcibly propagated to the containing pleura, and to the phrenic nerves. Hence then their influence muſt ceaſe, and the diaphragm be relaxed; and ſo, from a mechanical neceſſity, exſpiration muſt ſucceed by the ſpontaneous reſtitution of the overſtretched peritonæum, and abdominal muſcles: For theſe, compreſſing their contained viſcera, muſt puſh the midriff into the thorax, and ſo compreſs and ſqueeze the lungs much more forcibly than if they were left alone, to their own natural contractility. Thus then the preſſure of the lungs upon the circumambient pleura and phrenic nerves, muſt ſubſiſt all the time of exſpiration, until at its end every thing come to that ſtate of æquilibrium we firſt propoſed; wherein the contractility of the lungs bearing off ſome ſmall part of the preſſure of the atmoſphere from the pleura, the ſpirits find a free paſſage through the phrenic nerves, the diaphragm is contracted, and the air inſpired; which very ſoon comes to be expelled in the manner juſt now expreſſed. May it not then be allowed that we have explained the mechanical neceſſity

ceſſity of the alternate dilatation and compreſſion of the lungs, as far as they depend on the motion of the midriff? Since that muſcle being alternately contracted and relaxed, inſpiration and exſpiration muſt always ſucceſſively follow one another.

9. But ſince, beſide the action of the midriff, the figure and capacity of the thorax ſuffers a conſiderable change in reſpiration, by the contraction chiefly of the intercoſtal muſcles, and that eſpecially in women; the next ſtep ſhould be to conſider the condition of the nerves belonging to theſe muſcles; whereby, from an alternate compreſſion, or ſome ſuch mechaniſm, the muſcles may ſuffer an alternate contraction and relaxation.

In the common account of both internal and external intercoſtals conſpiring to dilate the thorax, and to produce inſpiration, it were very eaſy to ſay that the difference of the preſſure of the lungs upon the back part of the pleura, and conſequently upon the ſpinal nerves running behind it that furniſh ſpirits to the intercoſtal muſcles, is ſufficient to our purpoſe, in the manner we have explained the action of the phrenics. But, beſides the doubts I have a long time entertained about the action and the uſe of the internal intercoſtals, I am afraid you will tell me, that the thoracic ſpinal nerves, even before they be received between the double row of intercoſtal muſcles, are ſo well defended by the tenſe and firm pleura covering them at the ſide of the ſpine, that the variety of the preſſure of the lungs muſt have much leſs influence on them, than upon

upon the phrenics; for they, in their course along the pericardium, are but very slenderly guarded; and must therefore too be much more liable to such differences of compression, than the other nerves passing through the thorax and influencing the heart and other viscera equally in both states of respiration.

And this puts me in mind of something, which, tho' not directly belonging to our present subject, is worth observing in few words; and that is, That † the intercostal and eighth pair of nerves not only pass through the thorax, but pierce the fleshy part of the midriff. Whence you will be ready to conclude, (as was hinted by Morgagni) ‡, That their influence on the abdominal viscera should not be constantly uniform, but frequently pushed on, and interrupted by turns. And indeed this is very much countenanced by the wave like peristaltic motions of the stomach and guts, which would seem to argue the action of their nerves to be promoted and obstructed alternately.

But, though the alternate action of the intercostal muscles may not be so satisfactorily explained in the manner above mentioned, I do not despair of our coming to a better understanding of it, if we were perfectly acquainted with every minute circumstance relating to the structure of these muscles, and of the blood-vessels and nerves belonging to them; which therefore I would earnestly recommend to those curious

† Vieuss. Neurog. iii. 4. p. 183. 186, iii. 5. p. 194. 198.
‡ Advers. Anat. V. 12. p. 17.

ous and subtile diſſectors, who have both ſkill and opportunity to penetrate into the inmoſt receſſes of the human body, that ſome time or other we may become fully maſters of ſo elegant a problem.

COROLLARY.

Of the Beginning of Reſpiration in born Animals.

The illuſtrious Harvey propoſed this problem †, "Cur fœtus in utero, non reſpirans "aerem, uſque ad menſem decimum, ob defe- "ctum reſpirationis non ſuffocatur? cum natus "in ſeptimo vel octavo, quamprimum aerem "inſpirat, inhibita poſtmodum reſpiratione, ob "defectum aeris ſuffocatur? *&c.*" Many ſolutions have been offered by phyſiological writers, drawn from their different hypotheſes of reſpiration, the juſtneſs whereof it is not our buſineſs at all to examine: It is more to the purpoſe to propoſe and endeavour at a ſolution of another problem ſomething a-kin to it; which either has not been well minded, or not well underſtood hitherto, *viz.* "Why a fœtus, "in the time of geſtation, never dilates its tho- "rax, nor at any time before the birth performs, "however ſlowly, the motions of inſpiration "and exſpiration ſucceſſively?" Since, in the common hypotheſis, the inſpiratory muſcles having no antagoniſts, or but weak ones, there is nothing to hinder the dilatation of the thorax, and the reception of the liquor of the amnios into the lungs; which therefore ſhould be alternately

† Exerc. II. ad Rolan. p. 101. &c. de gen. anim. p. 263.

nately received and expelled, as the air is in born animals, if there were forces sufficient to carry on these motions.

This matter is easily cleared up from the preceding doctrine of alternate respiration; let us suppose, according to the old opinion, (which some particular considerations seem much to favour), that the two orders of intercostal muscles antagonize one another; and we may easily allow, that in gestation, while the fœtus continues enveloped in the secundines, and immersed in the *colliquamentum amnii*, the phrenic nerves are too much compressed to allow a free passage of the spirits to the diaphragm. But, as soon as the animal comes to light, and enjoys the external air from any the least motion of the breast, (and in every birth many such motions there are), the phrenic nerves which were formerly compressed by the lungs, *&c.* come now to have a part of that pressure taken off, in the manner we have formerly explained: So that they, being now at more freedom, will contract the midriff; which, being once set a going, will for ever suffer an alternate contraction and relaxation, while the animal continues in life and health.

XIII. *An ESSAY on the Nutrition of the Fœtus in Utero; by Mr* JOSEPH GIBSON *Surgeon at* Leith, *Member of the Society of Chirurgeon-apothecaries of* Edinburgh, *and City Professor of Midwifery.*

AS the most plausible account of generation, or the principles upon which it is established,

ſtabliſhed, are equally obſcure and controverted; ſo the way whereby the fœtus is maintained, both has and ſtill continues to be matter of diſpute among the learned. Thus the memoirs of medicine make it abundantly evident, that the queſtion relative to the nutrition of the fœtus *in utero* was very early agitated, as well by philoſophers as phyſicians; and, as they did not agree in their ſentiments, ſo the controverſy, even till this day, ſtands undecided amongſt the moderns; and, though I am well enough aware, that many more difficulties lie in the way than I am able to remove; yet, in order to clear this intricate ſubject, as much as I can, from theſe obſcurities with which it is ſo much clouded, I ſhall adventure,

1*ſt*, To range and ſtate the different opinions of authors, together with the grounds and arguments that ſupport them; and by the way ſhall hint alſo at thoſe which do oppoſe them.

2*dly*, I ſhall explain that opinion which appears to me to be moſt conſiſtent with truth, and endeavour to confirm it by evident facts, rational conſequences, and natural analogy.

Agreeable then to this method, the firſt opinion relative to the nutrition of the fœtus *in utero*, that offers itſelf to our conſideration, is the following:

That the fœtus receives all its nouriſhment by the mouth.

This notion was very early invented by Democritus * and Epicurus, as Plutarch teſtifies in

* Though Plutarch names Democritus, without any appellative, or diſtinguiſhing epithet, yet it is not once to be doubted

in his book *De placitis Philosophorum, lib. 5. cap. 16.* For maintaining whereof, the same author tells us, That these old philosophers assigned the following reasons: That in the uterus there are little duggs, to which the embryo applies its mouth, and from thence sucks its aliment; and that therefore, so soon as it is born, it draws its nourishment in the same manner from the breast.

The

doubted that it is Democritus Abderitanus, to whom he ascribes this tenet, and not to Democritus of Co. Nevertheless I cannot avoid to observe, (though foreign to my present purpose), that more than justice is done to the first, by the generality of authors †, when they assign to him the honour of having been master to the divine Hippocrates; for, if we reflect upon the variety of arguments used by the people of Abdera to persuade Hippocrates to come to, and undertake the cure of Democritus their fellow citizen, that of his having once been his master, could never have escaped them; nor would Hippocrates have engaged in that voyage, and in the care of Democritus, rather "from a commendable enough reverence to the "gods and nature," as he expresses it ‡, than at the most moving intreaties of the people of Abdera, or from a grateful sense of Democritus having been once his master; which consideration alone would have been a sufficient motive to have made him comply with their desire, if we remember the obligations he laid upon his disciples by oath ‖, "to honour the "person who taught them the art of medicine, as their natural "parent, to let him participate of all that lay in their power "in relation to the necessaries of life, &c." Wherefore, when Hippocrates is said to have been the disciple of Democritus, in my judgment, it ought to be understood of Democritus of Co, as Dr Douglas § hints, though I think the authority quoted for proving this, is by no means to be found in that place of Celsus, which is pointed at by this learned gentleman.

† Soranus, Suidas, Celsus, &c.
‡ Epist. S. P. Q. Abderitarum.
‖ Hippocrat. jusjurandum.
§ Bibliograph. anatom. specim. p. 7.

The first of which being imaginary, does not merit our attention; nor is there more in the second, as will appear from what may afterwards be advanced. Hippocrates indeed, and after him many of the moderns, have added much stronger reasons to prove that the fœtus receives nourishment at the mouth; but seeing the divine old man has likewise maintained that it is also supplied by the umbilicus, what he he has delivered in support of the first opinion will come more naturally under our thoughts, when we treat of the fourth; and therefore I shall in this place only take notice of those new arguments which I find advanced by any of the moderns to strengthen this old doctrine, and which will not so readily occur afterwards: These are reducible either to a denial of any communication of the blood-vessels of the mother and infant, or to an absolute unfitness of the mother's blood for that purpose.

Claudius de la Courvee, Cherletoun, Antonius Everhardus, Franciscus Bayle, Vander Wiel the father and son, have strenuously maintained the first of these by many arguments, which being mostly hypothetical, can by no means be particularly answered in this confined place; therefore let it suffice to say in general, That the denial of any communication betwixt the blood-vessels of the mother and infant, (which solely depends on this, that there follows no blood upon the division or separation of the umbilic vessels from the cotyledons of brutes), is an inference too hastily and inconsequentially drawn from a true observation; for, not to mention a multitude of things, besides the

number in which the brute cotyledons do differ from the human placenta, the very phænomenon which happens upon the ſeparation of the extremities of the blood-veſſels that belong to the brute foetus, from the alveoli or ſockets in which they are lodged, as it is very remarkable, ſo it eaſily ſolves the difficulty; for theſe alveoli, upon the extraction of the umbilic veſſels from them, are by their proper elaſticity inſtantly curled up, or as a purſe-mouth drawn together; whereby the effuſion of the leaſt drop of blood from them muſt neceſſarily be prevented: Whereas the uterine arteries of the human females, having the umbilic veins of their proper fœtus immediately implanted into them, without any intervening medium, (as in the comparative inſtance juſt mentioned), do conſtantly pour out blood, upon the ſeparation of the placenta from the uterus in abortions and at deliveries, which is always in a greater or leſſer quantity, and ſooner or later loſes the colour and conſiſtency of blood, as the uterine veſſels are more or leſs elaſtic, or as there are wanting or preſent impediments to the contraction of the womb.

Mr Juſſieu (ſo far as I remember) ſtands alone, in maintaining the nutrition of the fœtus by the mouth, from the conſideration of the abſolute unfitneſs of the maternal blood for its ſupport, imagining and aſſerting that there exiſt in it many fiery, and but few alimentary particles; and that its motion being too rapid, would rather beat into diſorder the weak and tender parts of the embryo, than gradually extend and increaſe it. The firſt two of theſe arguments

guments being trifling and precarious, scarcely deserve to be recited, far less to have any particular answer: Nor does there appear to be much in the third; however I shall have occasion, in the sequel of this essay, to obviate its force.

The second way then which we find condescended upon by the writers of physiology or anatomy, whereby they supposed the fœtus *in utero* to have been nourished, was by the umbilic vessels, and by these only.

The Stoic philosophers † were the first who taught and maintained this doctrine, and, so far as I can observe, enjoyed it alone for a very considerable time; though it is indeed obvious that Hippocrates, Aristotle, and Galen did also early affirm that the fœtus received part of its nourishment this way; yet, since it is likewise evident that they did not restrict its conveyance to the umbilic vessels only, they are by no means to be esteemed abettors of this dogma; and therefore Andreas Laurentius ‡ to whom, soon afterwards, Fabricius *ab Aquapendente* ‖, assented, is the first among the medical tribe who may be reckoned to have adopted this opinion: But indeed many amongst the moderns have since listed themselves as champions ready to defend this cause. I might here select my learned and ingenious friend §, for whom I have the greatest regard, and who so justly bears a considerable character in that society of

† Plutarch, de Placit. Philos. lib. 5. Cap. 16.
‡ Lib. 8. Cap. 6.
‖ Lib. de format. fœt. cap. 8.
§ Mr Monro, Professor of Anatomy.

which I have likewise the honour to be a member; but seeing he has hitherto only given it countenance, by affording some remarks and observations tending to establish it, which he communicates to us by the works of another †, I chuse rather to consider the arguments advanced for its support by Dr Bellinger ‡, who has treated this subject *ex professo*.

This learned gentleman taking the communication between the mother and infant by means of the umbilic vessels as granted or self-evident, goes on to establish the above doctrine by negative arguments, wherewith he pretends as well to exclude the mouth from having any part or share of action in the nutrition of the fœtus, as to demonstrate that the *liquor amnii* is an unfit *pabulum nutritionis*, and thence infers that the fœtus must receive all its nourishment by the umbilic vessels; but how well he succeeds in this, I shall presently enquire, by considering his arguments as they lie in order, of which this is the first and principal one:

"That since monsters have been brought forth "perfectly formed, their want of mouths, or, "in some, of heads, excepted, the fœtus can "therefore in a natural way be imagined to "have its nourishment communicated to it by "the mouth."

It might perhaps be esteemed a sufficient reply to this argument to retort upon him his own answer to Mr Bayle upon another occasion: "That we are not altogether to rely upon "some experiments and accidental occurrences

† Mr Cheselden's system of anatomy.
‡ De fœt. nutrit.

" rences in accounting for all the proceedings " in the animal machine." But to be more particular, this argument depends upon a very uncertain and precarious ſuppoſition, namely, that the want of any part in an otherwiſe well-grown monſtrous fœtus proves it to be uſeleſs in a natural ſtate; for at this rate (among many other inſtances,) it might be as juſtly denied that the *par vagum* in a natural fœtus does contribute to the motion of the heart, becauſe one of the monſters he condeſcends upon, *viz.* that taken from Paré, wanted the head: But as in ſuch inſtances where a part of the body is naturally ſupplied by two veſſels, and has by any accident one of them obſtructed, we do nevertheleſs frequently ſee the part to be well enough provided for by the other; ſo, in the caſe before us, the heart, which has naturally nerves both from the *par vagum*, and *intercoſtal*, is ſufficiently ſupplied by the latter, though the great Lower † has undeniably proved that it is the former which is the principal inſtrument of the motion of the heart in men, and thoſe animals whoſe bodies ſtand erect; wherefore it would in my judgement be very raſh to conclude, though Paré's monſter wanted the head, that therefore the *par vagum* in a natural ſtate is of no uſe: For my own part, in ſuch ſingular inſtances, I think it more reaſonable to be ſatisfied with attributing a greater than ordinary ſhare of action to that part which ſupplies the want of the other, than to deny the natural and ordinary function of that

† De mot. cord.

other part, in oppoſition to the moſt evident ſigns of its operation; this being to determine what is natural by what happens once, rather than by what happens uſually or almoſt always.

Next I would obſerve, that, where monſters have been brought forth wanting heads, or at leaſt having their mouths ſhut, it is obſervable that this defect, when ſuch productions have been accurately examined, is often, if not always, found to be ſupplied by ſome other contrivance.

To prove this poſition, I ſhall condeſcend upon two examples, the one taken from a human, and the other from a brute fœtus; the firſt of theſe being recited by Dr Gibſon in his anatomy of human bodies † at ſome length, I muſt refer to the paſſage, and only tranſcribe his ſcholium upon the diſſection: "This (ſays he) is a plain confirmation of the fœtus being nouriſhed by the mouth; for the gula being impervious (which is equal to its wanting the head, or having its mouth ſhut) nature had formed a hole in the wind-pipe and below in the gullet, for the liquor contained in the amnios to paſs into the ſtomach, which it might eaſily do without prejudice, or any fear of choaking the child in the womb while it breathed not; but, when it was born and came to breathe, there could be no longer any paſſage this way, and ſo the infant was neceſſarily famiſhed." And agreeable to this, Vander Wiel, ‡ the father aſſures

† Lib. i. cap. 33.
‡ Vol. 2. obſervat. 32.

assures us, that at the Hague he himself saw a monstrous lamb, who, having no mouth, had its nourishment, during its stay in the womb of the dame, conveyed it by an aperture in the lower part of the neck.

But further, when this deviation from nature does happen, and is not supplied in the manner I have hinted, the stomach is found empty, and there are few or no excrements in the guts†.

In fine, as the examples of such monsters are rare, neither extraordinary well vouched, nor often accurately examined, the arguments drawn thence against the nutrition of the fœtus by the mouth can never be conclusive, and in my opinion are sufficiently obviated by what I have already advanced; therefore I shall go on to consider the second argument, which stands thus:

"That the lips of all animals, even when "naturally formed, are so closely shut before "their birth, that it is as difficult to open them "as their eyes or nostril; wherefore the fœtus "can receive no part of its nourishment by the "mouth.".

But this is a fact which I refuse *ab autopsia*, and do appeal to those who are conversant in embryotomy, whether they do not for most part find all, as well human as brute fœtuses, when yet inclosed in the membranes, and swimming in the *liquor amnii*, to have their mouths more or less open, and even frequently observe that their tongues do somewhat hang out; but, since

† Regner. Graaff de mulier. organ. gener. inserv, cap. 15.

since I shall have occasion afterwards to prove this at greater length, I shall proceed to the learned gentleman's third argument, which is:

That though the mouth of the fœtus *in utero* were open, and allowed to be capable of receiving nourishment by it, yet the *liquor amnii* in which it swims is not a proper pabulum for its support; and this he takes to be sufficiently established by the following history: "A certain woman for some considerable part of "her pregnancy having laboured under a virulent gonorrhœa, but by proper applications was cured, though not long before her "time was up, the physician, who attended, "being curious to know the circumstances of "her delivery, was informed by the midwife "and several other women then present, that, "when the waters broke, there was a stench "so offensive, that some could scarce endure the "room; and the midwife assured him, upon "the question, that it was from the waters "that ill smell arose; notwithstanding this, the "child, which is a girl, and still living, was "born well and healthy, but the membranes of "the secundine were very tender and almost "rotten: How can it then be imagined, adds "he, that this child could live upon such waters "for its food? or how was it possible, if it "had received any of them into its stomach, "that it should not contaminate the tender viscera so as to have destroyed the fœtus?"

I am so far from being of opinion that this history proves what Dr Bellinger intends, that I even venture to affirm it rather supports the very contrary doctrine; for sure I am the fœtus

was

was in much greater hazard of being contaminated, by having such nourishment sent immediately into the blood by the umbilic vessels, than if it had received it by the mouth and stomach, for hereby its vitiated qualities might possibly have been altered: Hence Dr Pitcairn † affirms, that many acid substances, when taken into the stomach, do soon turn alcalious; and naturalists do unanimously agree, that there are many poisons, such as the virus of asps, vipers, &c. which are absolutely innocent when taken by the mouth, but carry along with them present death when immediately mixed with the blood: Thus we find the brave Cato, when marching the remains of Pompey's army through Africa, wisely animating the thirsty soldiers to drink of a spring that came in their way, which they were afraid to touch, because they found many serpents in it, by telling them:

Noxia serpentum est admisto sanguine pestis,
Morsu virus habent, et fatum dente minantur,
Pocula mortem carent ‡.

And Celsus §, when speaking of the serpent's poison, says:

Non gustu, sed in vulnere nocet.

But I must own that alcalines, or even alcalescents, are not turned into an opposite nature in the stomach, and that many vegetable,

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† Dissert. de opera quam praestant corpora acida vel alcal. in curat. morbor.

‡ Lucan. Pharsal. lib. 9.

§ Lib 5. cap. 27.

as well as mineral poiſons are deadly, though taken by the mouth; yet certain it is, that any noxious matter, when immediately mixed with the blood, does as certainly but more ſuddenly produce its direful effects,) as many experiments evince) than when the ſame individual thing is ſent into the body by the ordinary paſſages. Hence Galen † tells us, "That nothing "has the ſame power upon the human body "outwardly as inwardly; for (ſays he) neither the venom of the viper, nor of the "aſp, nor frothy ſpittle of the mad dog, are "alike miſchievous when they fall upon the "ſkin, or enter into the ſtomach, as when "communicated to the blood by a wound." But here indeed the tables are turned; for what is ſafe and innocent, when mixed with the blood, is rank and deadly poiſon if taken by the mouth; or elſe, what is fully as remarkable, the placenta has the faculty of ſeparating the pure from the impure, and has the goodneſs to ſend the impure to the amnios where it does no harm, and the pure to the fœtus where it does much good.

The laſt argument which our learned author brings upon the field, to prove the nutrition of the fœtus to be by the umbilicus, is deduced from the analogy between the nature and uſe of the *albumen ovi* and the *liquor amnii*; but as what he advances upon this head ſtands in oppoſition to the moſt valuable as well as ſelf-evident diſcoveries of the learned Malpighius and Bellini, I ſhall make no other return

† De temperam. lib. 3. cap. 2.

return to it, than to compare the assertions of Dr Bellinger and the two just now mentioned luminaries.

Bellinger † maintains, that the cicatricula is always inseparably united to the yolk, but never adheres to the white, nor has any passages to it that are visible with a microscope; and thence concludes that the chick receives all its nourishment from the yolk, but never any from the white; and therefore infers, that the *liquor amnii* in viviparous (which is analogous to the *albumen ovi* in oviparous) creatures, can be of no use in the nutrition of their fœtuses.

But Bellini ‡ asserts, that, a few hours after incubation, the cicatricula naturally leaves the yolk, and ascends to the *folliculus aeris*, where it remains till the exclusion of the chick. Malpighius § and Bellini demonstrate, that the yolk communicates but little to the chick, till within a few hours before it is hatched, when it is drawn in wholly by the *ductus intestinalis Stenonis*, or rather indeed and more properly of Needham ‖, and by it is conveyed to the *intestinum ilium*, to be voided soon after its exclusion: And therefore both affirm, that the chick is nourished mostly by the white, which is colliquated and forced into its bill by the *folliculis aeris*.

Having thus briefly discussed Doctor Bellinger's objections against the nutrition of the fœtus by the mouth, I go on in the next place to take

† Pag. 49.
‡ De mot. cord. prop. 9.
§ De format. pul. et de ovo incub.
‖ De form. fœt. cap. 4.

take notice of another and third way, whereby Alcmæon of Crotona † ſuppoſed the fœtus to be nouriſhed; and that was, by drawing to itſelf, as a ſponge, nouriſhment on all ſides of its body; and truly numberleſs experiments do put it beyond doubt, that the parts and membranes of animals are poſſeſſed of an abſorbing or bibulous quality; wherefore it will be no abſurdity to affirm, that the fœtus (by taking up ſome portion of the *liquor amnii* in which it ſwims) is in part nouriſhed by the ſurface of the body, as our author taught, particularly during the three firſt months; but after this period I am of opinion that theſe inlets are in a great meaſure, if not altogether, obſtructed and covered over with a whitiſh matter, at firſt tough, (and without diſpute the moſt viſcid part of the *liquor amnii*) but afterwards, in a great many inſtances, dried by the heat of the body into a kind of a cruſt well enough known to the midwifes, ſince every day it gives them ſo much trouble to remove.

But I haſten to the fourth and laſt opinion, which to me is abundantly probable, and teaches that the fœtus is nouriſhed as well by the mouth as by the umbilic veſſels.

This notion of the nutrition of the fœtus is as old as the great maſter and founder of medicine the divine Hippocrates, who, in his book *de Alimento* §, and elſewhere teaches, that nouriſhment is carried by the umbilicus, as in his treatiſe *de carnibus* ‖ he maintains, that the

† Plutarch. loco antea citato.
§ 7.
‖ 8.

the child in the womb with its lips compreſt together attracts nouriſhment, &c. which laſt he enforces with two very maſterly arguments, namely, that, unleſs the fœtus had ſucked *in utero*, it neither could depoſite excrement, nor know how to ſuck ſo ſoon as it is born; both which I would further illuſtrate, were I not aware that this laſt mentioned book is commonly ſaid to be ſpurious; and therefore any quotation taken from it can fix nothing upon Hippocrates that is not conſiſtent with what is taught in ſuch of his books as are owned to be genuine; wherefore I ſhall not now ſtay even to offer any arguments that might be brought to prove that there is not quite ſo much reaſon to ſuſpect this book as is ordinarily alledged, in regard Hippocrates himſelf ſeems to have conjoined theſe two opinions for which I now contend, in his treatiſe *de Natura Pueri*, which, ſo far as I remember, has never hitherto been called in queſtion, at leaſt it is to be found in the earlieſt catalogue of the genuine books of this author, as given by Erotian: For there Hippocrates † maintains the firſt of theſe, by telling us, that the embryo is nouriſhed by menſtrual blood ſent into it by the umbilicus: And, lower in the ſame book ‡, he points at the ſecond; for there, after having taught from what part of the aliment the milk is drawn, and likewiſe having inculcated the doctrine of the inoſculation of the mammary with the hypogaſtric veſſels, by ſaying in expreſs terms,

† § 5.
‡ § 21.

"That milk is carried to the breasts and "womb by the same veins; for these veins "and others like them (says he) go both to the "breasts and to the womb; and then adds, "When this little quantity of milk is come into "the womb, the child uses or enjoys it." Now, if we reflect upon these passages, it will be very evident, that Hippocrates believed that the fœtus was nourished by two different species of aliment: Hence, in a subsequent part of that same treatise, he expresses this very clearly, by telling us †, "That the fœtus draws to itself the "sweetest part of the blood, and likewise en-"joys a little milk." Which points as well at the menstrual blood carried to the fœtus by the umbilic vein, as at the *liquor amnii* drawn in by the mouth; it is true this last is not said in express terms, yet I think it is plainly understood: And thus we find Galen ‡, who is by all allowed to have understood Hippocrates best, alluding to these excerpts, when he tells us, "Neither, when Hippocrates says that "the first nourishment is brought by the navel, "are we to think him ignorant of the fœtus be-"ing nourished by the mouth, for he has also "spoke of this way." We can never then imagine that he is here pointing at the passage above cited from the book *de Carnibus*; for there the nutrition of the fœtus by the mouth is so expressly said, that Galen's caution would not only be superfluous but impertinent: But, that this may be further evident, Galen looked upon

† § 40.
‡ Lib. An animal sit id quod in utero est? cap. 3.

upon the book *de Carnibus* as ſpurious, and therefore its title is not to be found in any of the accounts he gives of the works of Hippocrates, at leaſt ſo far as conſiſts with my knowledge; and this alſo is the opinion of Le Clerc *.

But, not to dwell too long here, this doctrine ſubſiſted from the time of Hippocrates its author, till that of Laurentius † and Fabricius ab Aquapendente ‡, who brought it into diſcredit; under which it continued till it was again revived and well ſupported by the immortal Harvey ‖, who likewiſe maintained that the fœtus was nouriſhed both by the umbilic veſſels and by the mouth, with this variation, that Harvey § ſubſtituted an albugineous aliment in place of Hippocrates's menſtrual blood. Into which difference, as I am not now to inquire, ſo I ſhall proceed to eſtabliſh this opinion in the beſt manner I can; but, in order to do this more accurately, it may be proper to conſider (tho' ever ſo briefly) the embryo's gradual growth.

The impregnated ovum being ſhut up in the cavity of the uterus, by the contraction of its fibres, fluctuates and ſwims in theſe humidities which continually diſtill from the extremities of the uterine mucous veſſels, part of which fluid penetrating the coats of the ovum, and paſſing by the pores of the ſkin into the homuncio (as Alcmæon taught) muſt enlarge both,

* Cap. 27.
† Lib. 8. cap. 6.
‡ De form. fœt. cap. 8.
‖ Exercitat. 57.
§ De acetabul. uteri.

so that their bulk will fill the capacity of the matrix, and then the beginnings of the veins in the placenta will be implanted into the extremities of the uterine arteries, through which part of that serum or lymph, which before fell into the cavity of the uterus, will now be carried to the embryo by the beginnings of the umbilic vein, and what is more than necessary is again returned by the umbilic arteries to the mother; thus for some time there is a continued circulation of lymph, until the umbilic veins are so much enlarged, that they are capable of receiving red blood from the extremities of the dilated uterine arteries: But when this does fall out, whether about the end of the third month, when abortions (as those who are acquainted in midwifery do know) most frequently happen, is somewhat difficult to determine.

However it perhaps may in this place not be unpleasant to observe the infinite wisdom of our great Creator, so evident in the singular and wise contrivance by which this circulation is begun and maintained; for at first the motion of the lymph and afterwards of the blood from the mother, to the tender embryo, is exceeding languid and gentle, being but easily forced along the contorted branches of the capillary arteries of the uterus, and propelled through the small beginnings and great length of the umbilic vein, by no other force than that of the subsequent blood, by which admirable mechanism the beating into disorder the parts of the weak and tender embryo by the rapid motion of blood drove upon it by the reiterated pul

of the arteries, (a hazard of which some dreamed,) is happily prevented.

Thus then in the first months is the embryo supposed to be nourished; but, since the vessels of the uterus, which do not communicate with those of the placenta, will only separate a viscid and transparent liquor, which, by passing thro' the pores of the chorion and more delicate amnios, is thereby filtrated and made more fit for the food of the embryo, and forms that liquor in which the fœtus swims, and which it takes in by the mouth, as seems evident from these following reasons:

First, The fluid contained in the amnios, and in which the fœtus swims, is not an excrementitious liquor, but a *materia nutricatâs*; hence it is to be found in a very considerable quantity *, even before the parts of the fœtus are visibly delineated, and therefore sure it can never be deemed an excrement; or, were it such, Nature would not give herself the trouble to form so fine and delicate a membrane as is the allantois, if it served to no other purpose than to prevent the urine of the fœtus from mixing with another excrementitious liquor. Nor can the allantois be designed to keep the urine of the fœtus from galling and excoriating its skin, when this would equally happen from the liquor in which it swims, if it were, as is alledged, the *materia perspirationis*: But how evidently does the being of the allantois demonstrate the wisdom of a superintending Providence, by effectually hindering the urine of the fœtus

* Harv. Exerc 56. & lib. de membr. & h mor.

from mixing with the *liquor amnii*, its food? But further, if it be true (as undoubtedly it is) that there is no communication or immediate * connection between the uterus and impregnated ovum, for at leaſt the firſt two months, then certainly it muſt be acknowledged to be the *materia nutricatûs*; for it does not alter the nature of the argument, that in this period it paſſes into the fœtus, rather *per habitum corporis*, (as was before hinted,) than by the mouth; and thus, in mares and ſwine, there is no communication between the uterus and the chorion, till they be at leaſt half gone †, which undeniably and demonſtratively proves the *liquor amnii* to be a proper nouriſhment for the fœtus, unleſs ſome ſenſible difference can be condeſcended upon between the liquor in theſe, and that of other creatures: But further, if this liquor was not nutritious, and actually conſumed by the fœtus, more of it would be found in the amnios, at or near the birth; whereas it is then ordinarily obſerved to be almoſt ſpent.

Secondly, The mouth, nay even its chaſm, long before the lips are obſervable, is always open, as any who will take the trouble to blow a little air upon it by a pipe may ſoon be convinced of; for then they will remark its ſides evidently divide, which yet by no means happens to the eye-lids, nor ears, though the ſame method is uſed; and that it continues to be ſo afterwards, is evident from an obſervation communicated by an author of regard ‡, who aſſures

* Harv. Exerc. 56.

† Fab. ab Aquap. de form. fœt. part. 1. cap. 3.

‡ Heiſter. comp. anat. in not. pag. 247.

assures us, that oftner than once, in the cold winter season, he found the *liquor amnii* frozen, and continued through the mouth and oesophagus to the stomach; in a pretty large column; which not only demonstrates the *liquor amnii* to be a proper *materia nutritionis*, but even puts the matter beyond all dispute, that it is by the mouth this liquor is conveyed to the fœtus.

Thirdly, There are examples of human fœtuses which have been brought into the world alive, either altogether wanting the umbilicus and its vessels, or at least having the umbilic rope broke asunder some considerable time before their birth, as Chatton and Vander Wiel the father do relate †. Thus it is evident that the fœtus may be nourished by the mouth alone, when the umbilic rope is wanting, as well as by the umbilic vessels, when monsters are brought forth wanting heads, which I think is all should be made of these particular instances and deviations of nature, from her ordinary manner of operating; and thus it is as well with this view, I have related these histories in support of my present argument, as to convince Dr Bellinger of a mistake he seems to lie under, when he tells us ‡, "That nature has "brought the fœtus of some animals to a de- "gree of perfection in all other parts, without "the assistance of head or mouth; but never "without the umbilic vessels, which he even "challenges the whole history of physic to "contradict."

But,

† Vander Wiel, vol. 2. observ. 32.
‡ Tract. de nutrit. fœt. cap. 9.

But, that the force of these arguments may appear in one view, let me add by way of scholium upon them, that, seeing all the fœtuses of viviparous creatures swim in the *liquor amnii* (an undeniable *pabulum nutritionis*) and for the most part of gestation have their mouths open, we may safely *a priori* conclude, that part of this liquor enters that passage; and since we actually find the very same individual liquor in the mouth, œsophagus, and stomach, as is evident from Heister's observations, and that there is sometimes no connexion between the mother and infant, by means of the umbilic rope, whereby it can be sustained, as in the examples from Chatton and Vander Wiel, we may likewise affirm *a posteriori*, that the fœtus has part of its nourishment from the *liquor amnii*, and that it is conveyed to it by the mouth.

But, if we go further, and observe the nature of that liquor contained in the amnios, and that found in the stomach of the fœtus, we will soon perceive that they agree in colour, smell, taste and every other sensible property, excepting that the stomachical liquor is a little more gelatinous, some of its thinner parts being sucked up by the absorbent vessels of the stomach, which more and more obtains in its gradual descent through the intestines, its nutritious particles being in the same manner taken in by the lacteals, till at last in the great guts it is very much thickened; and then it changes also its colour by the mixture of the bile and *succus pancreaticus* with it; whence it has the name of meconium bestowed upon it. But, in the last months, these liquors dif-

more obſervably, for that in the amnios is vaſtly thinner, being more conquaſſated as well by the motions of the mother, as by the ſtirrings of the fœtus; nay it even at this time acquires a ſaline or urinous taſte, which is yet no argument against its nutritive quality; for nature gives a *folliculus aeris* to an egg, to attenuate the viſcid white into the moſt ſubtile fluor †, which is not coagulable ‡, but evaporates like urine, thereby changing its inſipid and inodorous ſubſtance into a ſaltiſh ſtenching nature, that it may be rendered fit for the nouriſhment of the chick.

In fine, if we remember, that in ſuch inſtances where monſters have been brought forth wanting heads, mouths, or ſuppar to either, the ſtomachs of ſuch are found empty, we may reaſonably conclude that the *liquor amnii* is the ſame with the liquor found in the ſtomach of natural fœtuſes, and may be convinced that this liquor is conveyed thither by the mouth.

I have already anſwered (as much as this confined place would permit) the objections to this particular opinion, when I treated of the firſt and ſecond way whereby the fœtus is ſuppoſed to be nouriſhed, and therefore might here put an end to the whole; and, though, I have all along choſen rather to reaſon from facts, than to introduce arguments depending upon uncertain hypotheſes; yet, ſince nature is always obſerved to act after a very uniform manner, I ſhall, in order to illuſtrate further what I have been hitherto maintaining, ſubjoin two analogical arguments,

† Willin. de mot. cord. prop. 8.
‡ Boid propoſit. 6.

guments, and with these conclude this dissertation. The first whereof is taken from the analogy between the vegetation of infant plants, and nutrition of animal fœtuses; for it is well known, that plants *in semine* have two different roots; first the seminal, whose fibres are inserted into the cotyledones of the seed, to convey to the plant its first nourishment from the mother-earth, and by which it is gradually extended, till it shoots out its second or plantal root, whereby it more immediately receives sap or nourishment from the ground; and thus for some time being supplied by both, the plantal root becomes at last large enough to nourish it alone; and then there being no more occasion for the cotyledones, they die and fall off. Just so the fœtuses of animals have two roots, (if I may be indulged in the simile), the umbilic vessels, which, by the intervention of the cotyledones or placenta, derive a liquor from the mother for its nourishment, by which it is gradually increased, till the mouth and viscera (its second root) be formed and enlarged to receive part of its aliment also; then it continues to be sustained both ways till it become ready for the birth, when its seminal root, the cotyledones, fall off, or the placenta is separated, and the infant born; when, as all know, it is able to be wholly supplied by its mouth or plantal root.

But the last analogical argument I mention is taken from the apparatus for nourishing the chick *in ovo*, where we must observe, that there is a similar liquor, as well as vessels de[si]gned for the same uses, as in animals. Thu[s] *alb*

albumen ovi is colliquated gradually by the *folliculus aëris*, and heat of incubation, and ſent into the cicatricula or amnios, for the nouriſhment of the chick; as in animals the *liquor amnii* is elaborated and fitted for the aliment of the fœtus, by paſſing through the pores of the chorion and amnion, the *albumen ovi* is always found in the mouth and gizzard of the chick, as the *liquor amnii* is obſerved in the mouth and ſtomach of the fœtus. The *albumen ovi* is entirely conſumed in the nouriſhment of the chick before it be hatched, and very little of the *liquor amnii* is left at the birth of the child.

Upon the whole, may we not, from a juſt analogical deduction, conclude, that the *liquor amnii*, in which the foetuſes of viviparous creatures ſwim, ſerves for the ſame uſeful purpoſes as the *albumen ovi* in the oviparous kind; and that both are carried to their proper young in the ſame way, that is, by the mouth?

Sed meliores meliora dicant.

XIV. *Two examples of children born with preternatural Conformations of the* Guts; *by Mr* JAMES CALDER, *Jun. Surgeon in* Glaſgow.

I. ABout a year ago, I was ſent for to viſit a new born child that had a large ſhare of its inteſtines lying without the teguments of the abdomen: I at firſt imagined the containing parts had been torn in the birth; but, upon examination, found the navel entire, and a perforation

foration half an inch above it, through which the guts had fallen out, with the skin closely united to them. The child seemed otherwise to be as lively and brisk as any new-born infant uses to be, and for 12 or 14 hours it received milk and syrups by the mouth, without any appearance of uneasiness; but, after that time, it vomited every thing till its death, which happened four days after, and all the while it had no passage by the anus. The guts, which were inflated, and had no peristaltic motion that I could observe, gradually inflamed, and, before the child died, were become perfectly black.

When the belly was opened after death, I found that the jejunum, all the ilium, and part of the colon, with the cæcum, had got out; the parts of the jejunum and colon, which were engaged in the preforation, were at that place so small, as scarce to allow a goose-quil to pass in their cavity they were adherent to each other, and had no appearance of a mesentery.

All the other viscera were sound.

The mother could not remember ever to have been surprised, frighted, or hurt, during all the nine months of her going with child.

II. About the same time that I had the opportunity of observing the former case, I visited another child, which lived full seven days after the birth, in which time it had never voided any *fœces per anum*, but vomited every thing it swallowed; which did not appear to have any mixture of meconium, bile, or any other coloured substance.

The parents, who were both healthy and found, having formerly loſt ſeveral children with the ſame ſymptoms, deſired me to examine the body of this child, to diſcover the cauſe of their death.

The ſtomach was in good condition, but the pylorus was very hard, and felt as if it contained ſome other ſubſtance, which appeared, upon opening of this inferior orifice of the ſtomach, to be a glandular like piece of ſolid fleſh, ſo cloſely adhering to the pylorus all round, that there was no ſeparating of it, and without the leaſt perforation in it any where; ſo that the paſſage was quite ſhut up. Below this, the duodenum was divided into two; and the gut continued thus divided to about one third of an inch above the jejunum. Into the largeſt of theſe inteſtinula the biliary duct opened.

All the inteſtines below were diſtended with air, and only a very ſmall quantity of meconium was to be ſeen near the podex.

The other viſcera were all ſound.

XV. *A wound of the neck with uncommon Symptoms; by Mr* JOHN KENNEDY, *chirurgeon-Apothecary in* Edinburgh.

CAptain Robert Jackſon, commander of the Sorlings man of war, betwixt 40 and 50 years of age, of a healthy conſtitution, and of a ſober life, was wounded in a ſea-fight on the right ſide of the thyroid cartilage, by a bullet which I diſcovered by the probe to pierce below the maſtoid muſcle. I dilated the

orifice of the wound, and dreſſed it up with warm *ol. catellor.* and applied a compreſs moiſtned with *Sp. V.* to the neck, keeping all on with a bandage.

Next day I carefully ſearched for the bullet, and, at laſt, felt it a little above the ſuperior coſta of the ſcapula. I cut thro' the teguments and trapezius muſcle, and extracted two bullets of a muſket ſize each, that had been caſt together, and were joined by a ſmall neck. I blooded him, kept his belly ſoluble with clyſters, allowed him a ſpare cooling diet, and endeavoured to promote the digeſtion of the wound in the common way.

The wounds cicatrized in five weeks, without any thing remarkable in their cure, except that, when the ſlough of the anterior orifice caſt off, the breadth of a herring-ſcale of the thyroid cartilage was laid bare, and appeared as white as ivory, and incarned without any apparent exfoliation. But there were ſome other circumſtances attended my patient, which ſeem to me remarkable, and induce me to ſend you the caſe.

No hæmorrhage happened during the whole cure, notwithſtanding the bullet paſſed through among ſo many large veſſels as lie behind the ſterno-maſtoid muſcle.

Immediately upon the patient's receiving the ſhot, his right arm, from a little below the neck, to the finger-points, became pale, quite cold, and benumbed, for which I bathed it with aromatic fomentations, rubbed it well with ſtrong ſpirits, in which alſo a double rag was dipped and laid over the arm, with red

bays

bays to cover all. In about twelve hours after, the arm recovered some heat; but the thumb of that hand was seized with a violent pain, which kept him all night from sleep; and the next day the pain was so unsupportable, that he was in danger of turning delirious, though his pulse was scarce quickened, and he had no thirst, or other sign of fever. I again let him blood, injected clysters, and applied emollient and anodyne fomentations and cataplasms to the member, without any success or abatement of the pain. The torture he was in obliged me to have recourse to some gutts of liquid laudanum that night, which did not cause sleep, but freed him from pain till next morning, when the pain returned as violent as ever, and continued so till the dose was repeated, which had the same good effects as formerly; but the pain returned as regularly next morning as it had done before. The third night I increased the quantity of laudanum, and thereby procured him sleep.

Finding, by repeated trials, that the opiate effectually gave him ease, I not only continued his evening dose, but gave him a smaller one in the morning, by which he was tolerably freed from pain. As the opium became familiar to him by long use, it had less effect on him; therefore, I gradually augmented the quantity, till, after six or seven months, his ordinary dose came up to 250 drops of *laud. liquid.* In the mean time a great variety of fomentations, bathing in warm milk, thrusting the member into the reeking bellies of slaughtered animals, &c. were tried, but none of them did any service.

Two months after he had received this wound, not only his thumb was pained, as already described, but such another pain was felt at the joint of the elbow without either swelling or hardness in the pained parts, or in the parts between them; and the fore-arm remained free from pain.

At the end of seven months these pains began to abate; in proportion to this, I diminished the quantity of laudanum: But, as the pain became less uneasy, the feebleness of the member increased; and, in twelve months, the pain was gone, and the use of the arm was entirely lost.

About two years and a half after receiving this wound, he went to Bath, and used the waters there for a season: When I saw him after that at London, he told me he had recovered the full use and strength of his arm.

XVI. *An Account of a large Bone extracted from the lower Part of the* Gullet; *by Mr* JOHN STEDMAN *Surgeon at* Kinross.

IN March 1731, William Angus, a strong young man, servant to John Henderson, farmer in Wood of Coldrain, near Kinross, hastily swallowed a large piece of the bone of a cow's head, in a spoonful of broth: He made strong efforts to force it down to his stomach, and was almost strangled before he swallowed it as far as an inch and a half above the xiphoid cartilage, where, but towards the left side of his thorax, he complained of a most violent acute pain. About 24 hours

hours after, he walked a mile to have my advice, but in such torture, that, when I saw him, he could scarce either sit down or stand. He had eat none from the time of this accident, and with the greatest difficulty could sip down any drink, though his thirst was great. He complained much of sickness, and his pulse was quick.

The difficulty he had to allow any drops of liquor to pass into his stomach, made me despair of bringing away this bone by emetics, which, if they did not succeed, would undoubtedly make his case more desperate. I was also of opinion, that attempting to push it down into the stomach, by thrusting a sponge fastned to a piece of whalebone down his œsophagus, would have no good chance to relieve him, because of the strait passage where the gullet passes through the diaphragam, which would be still more straitned by the present irritation; and I could not promise what effects the bone might produce after it was lodged in the stomach.

These objections to the common methods made use of in analogous cases, induced me to attempt an operation that I do not know is described by any author, which was the extracting it by the mouth. For this end, I caused a long rod of flexible steel to be made, and then bended each end of it into an oblong round, terminating at the extremity in a small button. This instrument I thrust down the gullet, below the pained part, and then gently drew it up; which operation I was obliged to repeat fifteen times, turning the instrument sometimes to one side, and then to the other, endeavouring

deavouring to engage the middle of the bone in the hook. Every time I introduced the inſtrument, he had a reaching to vomit, and always brought up a little blood with ſome other liquors. At the laſt attempt, which was an hour after I had begun the operation, I was lucky enough to bring the bone away, which, with the inſtrument then uſed, I herewith ſend you.

Tab. III. *Fig.* 1. Shows the ſhape of the inſtrument, and *Fig.* 2. repreſents the bone of the natural bigneſs.

Immediately after the extraction, he complained much of pain in his throat and breaſt, and continued, as he ſince told me, to be ſo much pained for a fortnight after, that he ſwallowed even the ſofteſt ſpoon-meats with exceſſive torture, was coſtive in his belly, had a thirſt, found his pulſe going ſwift, and was very ſick, but walked about. On the 14th day, he thought to have died with pain; after which he daily became eaſier, without either vomiting or paſſing by ſtool any thing like pus, but obſerved that the hard ſtools he had were of a dark red colour. At the end of twenty days, he was quite free of pain, and he has continued in perfect health ever ſince.

XVII. *An uncommon Tumour of the Breaſt; by Dr* PETER PATON, *Phyſician at* Glaſgow.

A woman about 38 years old, and to appearance of a good habit of body, ſhewed me a tumor which had been three months in

in her left breaſt; it was to the touch as hard as a ſtone, painful, and red all round, and protuberant in the middle. The woman, notwithſtanding the trouble of it, continued at her work, having the tumor covered with a *diachylon cum gummi* plaiſter. By degrees the tumor turned ſofter, and at length a ſmall ſuppuration appeared on the moſt protuberant part. Six months after I firſt ſaw her, as ſhe was reaping corn in the fields, this ſuppurated part broke, and a large bag fell out at the orifice, which ſhe immediately brought me.

The ulcer in the breaſt, cured in a little time, by waſhing it morning and evening with brandy, and applying ſome *ung. baſilic.* to it.

The bag that fell out of it was compoſed of ſeveral membraneous coats, the external of which was white and opaque, but the more internal were all pellucid; on the ſurface of the moſt internal, I obſerved two very ſmall caruncles.

The liquor contained in this cyſtis, to the quantity of ſeven or eight ounces, was clear and tranſparent like water, but a little fœtid to the ſmell, and bitter to the taſte.

XVIII. *Improvements in performing the operation of the* Paracenteſis, *or Tapping of the Belly; by* ALEXANDER MONRO, *Profeſſor of Anatomy in the univerſity of* Edinburgh, *and* F. R. S.

THE place where chirurgical writers determine the perforation to be made with the trocar in tapping the belly, is four or five inches

inches below, and as much to a ſide of the navel, or the point where a line at that diſtance from, and parallel to, the *linea alba* would be interſected by another line drawn perpendicular to the *linea alba*, at four or five inches below the navel. If this point is ſuppoſed to be determined on a healthy man of middle growth and ſtature, it certainly is a very ſafe and convenient place for making the puncture, for it is ſufficiently dependent, eſpecially when the perſon lies on the ſame ſide, there are no thick fleſhy bellies of muſcles to pierce, nor are the muſcles entirely tendinous, but are become tendineo-carnous; and at this place there are no large blood veſſels or nerves in hazard of being wounded: All which advantages no other part of the abdomen has: But then this rule of meaſuring four or five inches is certainly not to be applied to hydropic people, as being very precarious, and conſequently very often dangerous; for, though the diſtance is taken in full meaſure when the abdomen is diſtended, yet, when the belly ſubſides, the perforation will be found nearer to the navel in proportion to the degree of diſtenſion: As for inſtance, ſuppoſe that the anterior part of the abdomen is diſtended by water to double its natural length and wideneſs; that, when the water is drawn off, this cavity is contracted to its natural ſize; and that all the parts have been equally ſtretched, and are again equally contracted; then, though four inches were taken both ways from the navel, it is plain that, after the contraction, the diſtance each way will be but two inches, ſo that the perforation is not depending enough, the rectus

muſcle

muſcle is pierced, and probably ſome of the larger branches of the epigaſtric veſſels are wounded.

What undoubtedly is meant is, to make a proportional allowance for the quantity of diſtenſion, and ſome authors have ſaid ſo much; but none of them, except Garangeot, have laid down any other general rule for chuſing the place of tapping: He indeed ſays *, that the puncture ought to be made in the middle between the navel and ſpine of the *os ilium*; but, as this ſpine is of a conſiderable extent, his rule is much too uncertain, eſpecially conſidering that the preciſe point to be pierced can be determined in all ſubjects and different degrees of diſtenſion which the belly ſuffers in dropſies, by only remarking that in a ſound ſtate a point four inches below, and to a ſide of the navel, is the middle betwixt the navel and anterial ſpinal proceſs of the *os ilium*, and that the muſcular parts of the abdomen are near equally ſtretched in the *hydrops aſcites apertus*; whence it follows, that this middle point between the navel and this ſpinal proceſs is invariable, or nearly ſo; and therefore is the part where the perforation ought always to be made in tapping.

Till of late that Dr Mead, by preſſing on the abdomen with an aſſiſtant's hands, while the water of the *hydrops aſcites* was evacuated, diſcovered the ſudden taking off the preſſure from the deſcending aorta in ſuch ſubjects as ſcarce have blood enough to fill the veſſels of the body,

* Traite des operations du Chirurgie, tom 1. chap. 6. art. 1.

dy, to be the true reaſon of the ſyncope, inflammation, and great diſtenſion of the veſſels of the abdominal bowels, and particularly of the inteſtines; ſurgeons were very careful to draw off a ſmall quantity of water at once, and rather choſed to repeat the operation more frequently, though they were ſenſible at the ſame time of ſeveral diſadvantages attending their method; for, beſides the pain and uneaſineſs to the patient, and the danger orifices made any where in the teguments of hydropic people are in of mortifying, the guts ſtill loſe more of their tone by ſoaking long in water, the air being neceſſarily admitted by the canula into the cavity of the abdomen, is liable ſometimes to rariſy, diſtend the belly, and form a tympanites, and never miſſes to haſten the putrefaction of the water, from which a train of various bad ſymptoms muſt follow:

All theſe evil conſequences might then be prevented by drawing off all the water at once, and preſerving the preſſure ſtill on the belly, which can be ſupplied by art, but ought, for greater ſafety, to be done gradually and equally as the water runs out, which neither the preſſing with hands in time of the operation, and applying a bandage afterwards, which is the practice in England, nor the ſwathing with a towel immediately afterwards, as I have ſeen done in the hoſpitals at Paris, are rightly calculated for; and therefore theſe ſeveral years I have always uſed a belt, of the form in Tab III. Fig. 3. made of fine flannel, covered with ſtrong linen. The body of the belt A is only ſo wide as to reach from the ſpine of the

one

one *os ilium* to that of the other; to one end of this body ſtrong tapes or ribbons B are ſewed at a little diſtance from each other, and to the other end as many well poliſhed buckles C are put. Near the inferior ſide of the belt, and at a ſmall diſtance from each end, a little window DE is cut, which can be ſhut with two buckles G, and ſtraps F.

When the operation of the paracenteſis is to be performed, I mark with ink the middle point between the navel and anterior extremity of the ſpine of the *os ilium* of the ſide which I deſign to pierce; then I apply the belt with the flannel ſide next the ſkin, well charged with fumes of *benzoin maſtich*, and ſuch other drying and corroborating medicines, taking care that the point of the ſkin formerly marked with ink, ſhall be in the middle of one of the windows or openings of the belt; after which a linen compreſs, or piece of flannel, is put on the back, to defend it from being hurt by the buckles, and a long piece of flannel three or four fold is put under the buckles, that they may not fret the ſkin: And, laſtly, the ſtraps or tapes are put through the buckles and drawn a little tight, by which the water is preſſed in greater quantity to the part of the abdomen where there is the leaſt reſiſtance, which will be the part uncovered by the belt, or the open window; and therefore that part becomes more prominent and tenſe, which facilitates the perforation, and makes a greater diſtance there between the containing parts and viſcera, and conſequently makes leſs danger of the guts, &c. being wounded by the point of the trocar.

Gradually

Gradually as the water is drawn off, the ſtraps are pulled ſtraighter, and if the patient will be ingenuous, the ſame preſſure can be kept on the abdomen, all the time of the operation, and after the entire evacuation, as was on it before one drop of the water was taken away; becauſe the operator has a very certain gage, the breathing, to judge by; for the difficulty of breathing which hydropic people labour under, being wholly the effect of the water preſſing the diaphragm upwards, and thereby ſtraitning the lungs, any force equal to that of the water preſſing all the parts of the abdomen equally will have the ſame effect: For this reaſon the patient muſt, from time to time, acquaint the ſurgeon if he is ſenſible of his breathing more freely, when the ſtraps are to be drawn tighter, till the patient judges the difficulty of breathing to be the ſame as it was formerly. In this way I have drawn off more than once, from very feeble emaciated patients, ſixteen Scots pints, or ſixty four pounds of water at once, without the leaſt faintneſs or uneaſineſs.

After all the water is evacuated, which is greatly aſſiſted by the preſſure, a pledget and plaiſter are to be put on the orifice, from which the cannula was taken in the common way; and, a compreſs being applied over theſe, the window is to be ſhut on this, and brought to the ſame tightneſs with the reſt of the band. At pleaſure this window can be opened and ſhut, and the wound can be dreſſed, and the whole belt may, as occaſion requires, be ſlackned or ſtraitned.

In Tab. III. *Fig.* 3. *this belt is repreſented.*

A. Its body.
B. The ſtraps.
C. The buckles.
D. The window.
E. The part of the belt that cloſes up the window.
F. The ſmall ſtraps.
G. The little buckles.
H. The window ſhut up.
I. The ſtraps and buckles.

The belt juſt now deſcribed is what I have only made uſe of hitherto, but have ſometimes been ſenſible of inconveniencies in applying it when the belly is very greatly diſtended; for in ſuch a caſe the *oſſa innominata* kept the belt from being right applied to the lower part of the belly, which is ſtretched down over the patient's thighs; the ſuperior part of the abdomen, being conſiderably ſmaller than the lower, is not ſufficiently ſtraitened, and after the operation is finiſhed, the belt is liable to be gathered all in wrinkles round the loins, eſpecially if the patient is reſtleſs and careleſs.

To prevent theſe inconveniencies, I think a further improvement may be made to the belt: See *Tab.* III. *Fig.* 4. Let a ſlanting flap K be added to its inferior edge; from which let two ſtraps L L, with buckles at their extremities, go out to paſs between the patient's thighs, and to be faſtened to other ſtraps M M, which come out from the upper edge of the circular band, or to a ſcapular bandage brought over the patient's ſhoulders: It is evident that the flap K will compreſs the hypogaſtric region, which the circular belt could not reach; and

that the additional ſtraps being tightly drawn, will keep the circular band ſtretched at its full breadth.

Since this improvement was propoſed in our firſt Edition, the belt made in this form has been frequently uſed here with ſucceſs.

XIX. *Worms evacuated at an ulcer of the* Groin; *by Mr* JAMES DOUGLAS, *Surgeon to General* Sabine's *Regiment.*

WHILE the regiment I have the honour to ſerve in was quartered at Portſmouth in September 1731, a woman belonging to it was taken with gripes, vomiting, and coſtiveneſs, which continued five days, notwithſtanding all I could adminiſter; but at laſt, by the frequent uſe of lenient clyſters, ſhe had ſome ſtools which eaſed her gripes in a ſmall meaſure, the vomiting ſtill continuing, with ſeveral ſymptoms which ſeemed hyſterical; wherefore I gave her internal, and applied external medicines for this intention.

On the eighth day of her illneſs, ſhe vomited a worm of the teres kind about a foot long, whereupon the complaint of her ſtomach abated, her gripes ſtill continuing, yet not ſo violent as the firſt: She now informed me of a tumor ſhe had above a year and an half in her right groin; ſhe would not allow me to ſee it, but told me it was as big as a ſmall hen's egg, and by gentle preſſure with her hand receded, and never gave her any pain till now. I judged this tumor to be a hernia, and adviſed the application

plication of an *empl. ad herniam*, with compreſs and truſs, which ſhe thought eaſed her about three days.

When I viſited her the fourth, the pain was much increaſed, and ſhe felt a pulſation in the tumor; I then prevailed on her to let me ſee it, and was ſurpriſed to find a large inflammatory tumor tending to ſuppuration, without any ſwelling of the inguinal glands: Her other complaints in the mean time abated, from the uſe, as I think, of the following bolus, which ſhe took morning and evening ever ſince ſhe vomited the worm; ℞ *Æthiop. mineral. gr.* xxiv. *calomel. gr.* iii. *conſerv. roſ. rubr. q. s. ut fiat bolus.*

I applied a ſuppurative cataplaſm two days; and on the third, which was the fourteenth of her illneſs, opened the tumor with a cauſtic in the common way, and diſcharged near four ounces of a ſerous like matter: I then dreſſed the ulcer with ſome red precipitate, and pledgets covered with *ung. baſilic.* with which a little *ol. terebinth.* was mixed, over theſe I put a compreſs wet in tepid *ſp V. camphorat.* and kept all on with the T bandage: After three days dreſſing in this manner, the inflammation and tumefaction, which had extended from the *mons Veneris* to the anterior ſpinal proceſs of the *os ilium*, were much abated, the diſcharge from the ulcer was ſmall, and the matter was leſs fœtid and better digeſted, whereas at firſt the ſloughs that were taken off were ſo fœtid, I could ſcarce bear the ſmell of them. Finding the ulcer now ſufficiently cleaned, I dreſſed with common digeſtive only, and it

seemed to be in a fair way of healing very fast, without any accident till the twenty-third day, when, being now so strong as to sit up, I had given her this cathartic in the morning, ℞. *decoct. senn. unct.* iii. *tinctur. sacr. drach.* ii. which wrought her pretty well, and coming to dress her about three in the afternoon, she shewed me a worm about five inches long, of the teres kind, which she told me had come out of the ulcer; and that she had forgot to inform me of such another having come away two days after my opening the tumor. Upon taking off the dressings, I saw the corner of the ulcer next the *os ilium* bloody, and searching there with my probe, penetrated into the abdomen, which made me resolve to keep the ulcer open for some time, to allow a passage to any other of these creatures that were to be discharged. That same evening, her husband brought me another worm of the same kind, and ten inches long, which had come out of the ulcer as the patient was sitting at the fire-side.

On the twenty-sixth, I repeated her physic, with the addition of *pulv. jalap. gr.* viii. which gave her three stools, and all day there was a discharge from the ulcer, like the juice of leeks, which seemed to differ from what she passed by stool, only in being of a darker colour. This excrementitious discharge, accompanied sometimes with wind, continued some days longer from the ulcer, the patient having also a stool in the natural way every day.

The discharge at the ulcer decreased gradually till the thirty-third day, when nothing but

but laudable pus was to be ſeen on the dreſſings; and, in a week more, obſerving no return of the excrements this way, I endeavoured to cicatrize the ulcer, which was done in a few days, by applying Turner's *ceratum de lapide calaminari*; in the mean time I took care to keep her belly orderly, without allowing her to be coſtive, or purging her.

She remained perfectly well above a month, when a very ſmall hole broke out in the cicatrix, and diſcharged the thinner part of the excrement, but without any pain or hindrance from her buſineſs. It has remained in this condition ever ſince, with only a very ſmall quantity of ouzing matter, notwithſtanding her riding two hundred miles; and I believe ſhe muſt ever be contented to dreſs it daily with digeſtive or the cerat, according to the different circumſtances of the ſore.

XX. *A Mortification of the Guts in a* Hernia *cured; by Mr* JAMES JAMIESON, *Surgeon in* Kelſo.

IN the middle of December, a vigorous labouring man, 28 years of age, who lives three miles from Kelſo, was ſeized with a violent colic, for which he got next day a purgative medicine from a gardener that operated very well, but without removing his pain. The day following, a large ſwelling appeared in the right groin and right ſide of the ſcrotum, on the middle part of which a mortification, about the dimenſion of a ſhilling, was obſerved the

second day after; and on the third, the mortified part fell off, and was followed by a large discharge of excrements at the orifice, upon which all his pains ceased.

The first time I visited him was the seventh day of his sickness, when he was free of pain and fever; the tumor of both groin and scrotum were entirely gone, without any one's having made an attempt to reduce the gut, which certainly, by its descent, had formed the hernia. His excrements came out in great quantity at the opening made by the gangrene, and a grumbling noise of wind was heard in his belly. In handling the scrotum, I could not feel the right testicle, nor has it ever been felt since, though the patient is positive he had it before this disease attacked him. I inquired at all the people who attended him, concerning the quantity of rotten flesh that had been cast off, but could receive no information; all of it having been thrown out undistinguished from the excrements.

I caused him to be carried to this place next day, and brought all the physicians and surgeons here to advise his case. In the consultation it was determined to inject warm claret wine at the orifice morning and evening, and to keep constantly on the part a compress dipped in the same liquor, over which a four-tailed bandage should be applied: The patient to be confined to his bed; to be allowed only a milk diet, and to administer every day a clyster composed of a decoction of the emollient and some vulnerary plants, in which turpentine,

pentine, lenitive electuary and oil were diſſolved.

This method ſeemed to ſucceed well for ſome time, the quantity of excrements paſſing at the groin gradually decreaſing, and the evacuation by the anus being proportionally increaſed; whereas the largeſt ſhare of the fœces was formerly voided at the preternatural orifice, and no bad ſymptom appeared till the twelfth day, when, no fœces coming by the groin during twelve hours, he was ſeized with ſharp pains in the umbilical region, attended with continual vomiting and ſingultus, with tremors like thoſe of an ague, cold ſweats, and a low frequent pulſe.

At the firſt appearance of theſe dreadful ſymptoms, I let blood of him plentifully, injected a laxative and emollient clyſter every three hours, fomented his belly with a warm emollient fotus, and made him frequently ſwallow ſpoonfulls of an anodyne cordial mixture. Having uſed theſe near twelve hours, the patient evacuated ſome hardened excrements at the groin, the ſymptoms began to abate, and gradually went off.

When the bad ſigns were all gone, we put him again on his former regimen, but mixed ſome *mel. roſar.* with the claret that was uſed for the injection; continued to foment his belly twice a-day; and in the time between the fotuſes, covered his belly with an emollient and gently aromatic cataplaſm. We alſo added carminatives to the clyſters.

From this time the diſcharge at the rings of the muſcles daily diminiſhed, and after ſix weeks

weeks nothing appeared on the cloaths except a ſmall quantity of ichor that had no ſmell.

I ought to obſerve, that no part of the clyſters ever came out at the orifice of the ſcrotum, and that none of the injection could be obſerved among the fœces which he paſſed the natural way.

A very little quantity of the ichor is ſtill diſcharged from ſo ſmall an orifice of the ſcrotum, as will not admit a probe. But there is no fulneſs nor hardneſs; his excrements come regularly the natural way, and he is otherwiſe in perfect good health, having herded cattle theſe ſeven or eight weeks paſt: I have however cauſed him to wear a truſs by way of precaution.

This paper was ſent us ſeveral months ago, and we have been lately informed by the author of it, that this patient has remained in perfect good health, has no diſcharge at the ulcer, nor occaſion for a bandage ſince a week or two after the caſe was ſent us.

XXI. *Stones in the Kidney, with Remarks on the Operation of* Nephrotomy; *by Mr* JOHN DOUGLAS, *Surgeon in* Edinburgh.

————Aged 53 years, of a robuſt make of body, having large muſcles, and remarkably big blood-veſſels, the veins of his arm at the common blooding-place being to appearance an inch in diameter, was afflicted, ſince four years old, with a violent pain in his right ſide

ſide about the region of the kidney, from which he never was at any time perfectly free; but he often had tolerable intervals; otherwiſe he was very healthy.

In his younger days he was ſalivated by Dr Pitcairn's order, and had many different advices from ſeveral other phyſicians, but ſeldom got relief from any thing, but the drinking large draughts of warm water, even to the quantity of three Scots pints (12 pounds). He more than once ſuffered ſuch violent pain for ſome months, that he was obliged to lie the whole time on a coverlet laid on the floor; the preſſure of his pained ſide on the hard floor giving him ſome remiſſion from pain. While the pain continued, all the urine he paſſed, after it had ſtood and cooled a little, became like gleet, or whites of eggs. He had often a diarrhœa, without any gripes, and could at pleaſure even then refrain going to ſtool for a whole day. And in the ſame way he could retain his urine, till his bladder was ſo full, as to diſcharge near three chopins (6 pounds) at once. Several meats and drinks, ſuch as eggs, butter, fry'd meat, punch, and white wine, gave him pain; ſmall malt-liquor rather eaſed him, for which reaſon he for ordinary drank plentifully of it.

About the beginning of February 1731, he contracted a violent cough, which brought on a conſumption, of which he died, March 29th thereafter; tho', by all appearance, before that time, his lungs were in exceeding good condition.

I was allowed to open his body before Dr Robert Lowis and Mr John Wallace ſurgeon; and having always been of opinion that there was a ſtone in his right kidney, I reſolved firſt to imitate the operation called by authors *nephrotomy*, which is ſaid to have been performed ſucceſsfully by Dominicus de Marchettis; but I met with ſuch difficulties, as give me great reaſon to wiſh that either Marchettis had given us the account of it, or that the previous ſymptoms of Conſul Hobſon had been ſet down, whereby we might be certain of the ſtones having been cut out of the kidney itſelf; and all ſuſpicion might have been removed of its having already made its way through the greateſt part perhaps of the containing organs. The difficulties, I mean, are the thickneſs of the common teguments and muſcles which was in this body no leſs than $3\frac{1}{2}$ inches. When the peritoneum was laid bare, I obſerved the colon betwixt it and the convex ſurface of the kidney; after that gut was removed, a large nerve preſented itſelf, lying juſt acroſs the place where the kidney ought to have been cut. And the depth of my inciſion was now ſo great, that I found it impracticable to penetrate through the ſubſtance of the kidney into the pelvis; and therefore I turned the body into the common ſupine poſture; and, opening the kidney in the ordinary way of diſſection, I took out the two ſtones herewith ſent. See *Tab.* III. *Fig.* 5. 6. The largeſt, *Fig.* 5. weighing half an ounce, was found in the pelvis. The figure of it you ſee is triangular, with its ſurface ſtuck full of ſmall granula, as big as coriander-

ander-ſeed, which ſeem to have been united after the ſtone has been formed; for they were of different hardneſs and colour, being black, whereas the ſurface of the ſtone below them is brown and firmer. The leſſer ſtone, fig. 6. which weighed 16 grains, and is of an irregular ſquare figure, was lodged in the ſubſtance of the kidney. Beſides theſe two, there were a great many other ſmall ſtony concretions diſperſed every where in the *tubuli uriniferi*; many of theſe were bigger than the largeſt grains of ſea-ſand.

XXII. *An Anomalous Tumour of the Leg, unſucceſsfully treated, by*————*.

A woman, about forty ſix years of age, after having been troubled ſeveral months with a tumour on the out-ſide of her leg, aſked my advice. The external part of her leg was equally ſwelled, only about the middle it pointed, as we commonly call it, or was more prominent, red coloured, and felt ſofter; and, on preſſing it with the fingers alternately, a liquor fluctuated below them. The pains of this tumour were ſo violent, that the patient aſſured me they had not allowed her, for ſome time paſt, to ſleep a quarter of an hour at once. Her body was very lean. She had no appetite, but a conſtant thirſt. The hectic paroxyſms

* The author of this paper having claimed the performance of the promiſe we made in our propoſals, we have complied with the deſire of his letter, by ſuppreſſing his name.

paroxyſms and night ſweats came regularly every day. Every third day ſhe was ſeized with a diarrhœa. Her menſtrua had left her a conſiderable time before.

Imagining moſt of theſe ſymptoms to proceed from pus pent up and abſorbed by the eroded veſſels, I was of opinion they would probably abate, if that matter was freely evacuated by an external orifice. Having therefore applied ſuppurating cataplaſms two days, and the teguments of that prominent part becoming thinner with the fluctuation ſtill more evident, I made an inciſion of an inch and an half long with a lancet: In the cutting, I was ſenſible, by the reſiſtance and grating ſound at the edge of my lancet, that the tendinous aponeuroſis was cut; tho' the inciſion was large and deep enough, not one drop of pus was diſcharged, only two or three ounces of mucus dropped out.

Next day I brought two ſurgeons in my neighbourhood to viſit my patient, and, having taken off all the dreſſings except the pledgets which covered the orifice, I deſired them to feel the ſwelling, and give me their opinion of it. They both affirmed their having felt the fluctuation of matter under their fingers. When the laſt pledgets were taken away, a fungus appeared at the orifice, which reſembled the flabby *tunica celluloſa*, ſo often to be ſeen in the back and other depending parts of thoſe that die of tedious lingring diſeaſes. I cut off ſome of this fungus, put gentle eſcharotics on the remains of it, and dreſſed the reſt of the wound

wound with ſuppurants. On the ſecond day, the fungus came out much larger, and violently ſtretched the aperture of the teguments and tendinous aponeuroſis, by which a gangrene was begun all round the edges. I cut off the fungus, enlarged the orifice conſiderably, and dreſſed it up with antiſeptics and ſuppurants in the common way. In two days, the gangrened parts fell off, and, the aperture being now very large, I diſſected from between the two bones of the leg, near a pound of that flabby ſubſtance. After having cut as deep as I durſt, without riſking the opening of the large arteries, I thruſt a probe through that ſoft fatty ſubſtance, till I felt it and ſaw it ſtriking againſt the ſkin of the oppoſite part of the leg.

Expecting therefore no ſucceſs from this method, I reſolved to perform the amputation as ſoon as the fever and diarrhoea, which were now come on, were abated; but neither were ſtopped by any medicines given, and in a few days the patient died.

The ſkin of all the leg appeared after death ſound, but the *tunica celluloſa* and muſcles were all degenerated into that pappy ſubſtance which had appeared as a fungus; and I could not diſtinguiſh one muſcle from another, though I was at pains to diſſect them.

The perioſteum was every where ſeparated from both tibia and fibula; between it and the bones, an acrid dark-brown liquor was contained; and the ſurfaces of the bones were rough and yellow.

I had occaſion ſoon after to ſee a leg affected with juſt ſuch another ſort of tumor, but

it was opened ſooner, before any other bad ſymptoms had come on. It would not cure with either external or internal medicines, and the patient would not allow amputation; ſo that it was palliated, till both ſurgeon and patient wearied of each other.

Pray, Gentlemen, under what claſs of tumors is this to be reckoned? Is it a-kin to the windy ſwellings of the joints? Or to what the French call the *fatty tumours*?

If you know the ſpecies of tumor, what is the pathognomic ſign by which it is to be diſtinguiſhed from *eryſipelas-oedematodes*, or the ſlow phlegmons? for I am much afraid of falling into ſome ſuch miſtake as the former, unleſs you will explain the difference to me.

XXIII. *The larger Share of the* Tibia *taken out, and afterwards ſupplied by a* Callus, *by Mr* David Laing, *Surgeon at* Jedburgh.

A Girl in the pariſh of Maxton, about ſeven years old, who never had any diſeaſe except the ſmall pox, accidentally hurt her right leg, and ſoon after, the teguments on the fore-part of the tibia ſwelled a little, but were not diſcoloured till two months after, when a redneſs about the breadth of a ſixpence appeared on the ſkin, and an ulcer ſoon followed, which made the patient's parents aſk my advice.

The child was at this time much decayed, her fleſh and ſtrength being waſted, and her frequent pulſe, great thirſt, and want of appetite,

petite, with other appearances of a hectic diſpoſition, made the prognoſis very indifferent.

I cauſed the part to be well fomented with emollients, and applied cataplaſms of the ſame kind: But, finding no advantage by the uſe of theſe, and diſcovering by the nature of the matter that came out of the ſore, and by the colour, ſoftneſs, *&c.* of the fleſh, ſigns of the bone's being affected, though it was not yet in ſight, I made a ſmall inciſion in the teguments to lay the bone bare, by which my ſuſpicions were fully confirmed.

I ſoon now ſaw that the diſeaſe in the bone extended farther than the opening of the teguments; and therefore, from time to time, I enlarged the inciſion, till I came to the extremities of the affected piece of bone; which method I rather choſed to follow, than to hazard making at once, in this feeble hectic patient, ſuch a large opening as would have been neceſſary.

I dreſſed the ſore with tincture of myrrh, cauſed the patient to take a decoction of the woods, with a ſmall quantity of *aq. calcis* twice a day, and gave her an antiſcorbutic and aperient medicated ale for ordinary drink.

After continuing theſe dreſſings and medicines about ſix months, the bone I ſend you was taken out. (See the fore-view of it in fig. 1. and the back-view of it in fig. 2 of Tab IV.) You ſee it is the whole body of the tibia, the length of the ſuperior part of what remained towards the knee, being three fingers breadth, and the inferior extremity towards the ancle, being only one and an half long.

In six weeks, the sore was cicatrized; and, in a month after, the child began to walk, before the callus was sufficiently hardened, which made it turn a little crooked, as it still remains, but is otherwise smooth, and as hard and firm as any other bone of her body: So that she walks, dances, leaps, &c. without the assistance of a crutch or staff, and without the least observable halt.

Towards the end of her cure, I gave her tincture of antimony, to remove a dry itch that was over her whole body. A considerable time after her leg was sound, a new ulcer appeared on the superior part of the arm, and now there are two sharp points of the *Os humeri* standing out at the orifice in the teguments. This attack on a part that never received any injury, makes me of opinion that the ulcer of her leg was not occasioned by a hurt at school, which the parents assign as the cause of the disease, but that it was rather owing to her bad habit of body.

Mr William Carlyle, apothecary in Carlisle, favoured us lately with a history of a case very like to this. The part of the tibia which was taken out is seven inches long; the boy to whom it belonged was twelve years old; the cure, which was almost entirely performed by nature, was two years in being completed; and there is no inconveniency remaining, except that the patient cannot stretch the heel of the leg out of which the bone was taken so well to the ground as he does the other.

XXIV. *An*

XXIV. *An ESSAY on Mr* Garengeot's *good Manners and universal Learning, inscribed to the Memory of Dr* Friend, *by* —— *Prentice to a Surgeon-Apothecary in* Edinburgh.

Inops, potentem dum vult imitari, perit. Phædr.

* IT is certainly just, that, in matters of philosophy, every one should be at liberty to give his opinion, and to redargue what others have advanced: But there is a certain decency of expression which ought to be observed in all disputes, especially when those whom we undertake to refute are men of at least equal character to ourselves, and who have otherwise given good proof of their learning and ingenuity, employed in the service of the public: Whoever transgresses in this piece of prudent good manners, cannot complain if he should be attacked in his turn with some severity.

The design of this preamble is to introduce a few remarks on an author whom you seem engaged to take some notice of, if I rightly understand your proposals; it is Garengeot, who, in

* This young gentleman either misunderstands our proposals, or forgets the promise in his preamble, of using no expression which might trespass against the rules laid down to our correspondents: For we must think that he has not shunned offensive terms and personal reflections, even when he pretends to make great compliments; and therefore nothing less than the regard we have for the memory of the learned Dr Friend should have prevailed on us to insert this paper. We desire no more such may be sent us, otherways their authors need not expect that we will publish them.

in the preface to the new edition of his Chirurgical Operations, in three volumes 12mo, warns us, that he is to cenſure ſeveral people, but aſſures us, (p. 15.) "It is to be with good manners, "and that charity we owe one to another." In his book he appears to have quite forgot this promiſe, particularly with regard to an author who is univerſally acknowledged to have been an accompliſhed gentleman, a fine ſcholar, and an honour to his profeſſion. It is true, Dr FREIND in part deſerved the uſage he has met with from Mr Garengeot, for ſtooping ſo far beneath himſelf, as to give occaſion to the diſpute

The Doctor, alas! is no more; his aſhes are inſulted, and none appears to vindicate the injury, which has engaged me to ſend you this paper, in hope it may excite ſome other to treat Mr Garengeot in a manner ſuitable to the politeneſs of the following ſentences, (p. 404.) "*Voila la ſeule conſideration qui m' a porté* "*a relever les VETILLES de Mr Freind.*" And (p. 428.) "*Ainſi ſans faire attention a* "*des objections qu' un ecolier ſe fût bien gardé* "*de faire.*" Theſe are very handſome flouriſhes, "The impertinent trifles, or old woman's "tales of Mr Freind. The objections of Mr "Freind, which a ſchool boy would have ta"ken great care not to make, or would have "been aſhamed of." It would ill ſuit me, who can at preſent aſſume no other character than of an *Ecolier*, to retort on a *Demonſtrateur Royal* in language the leaſt of kin to this; therefore, in examining the diſpute that has occaſioned theſe ſtrong words, and in ſome more re-

marks,

marks on Mr Garengeot's first volume, I shall be greatly on my guard to use no unbecoming expression, which might trespass against the rules laid down to your correspondents in your proposals.

Dr Freind had said, that Mr Garengeot's distinction of a dropsy into that by *epanchement* (effusion) and *infiltration* is not just, and that the latter is not a word in any language. Mr Garengeot answers this, (p. 403.) with a *Voila une remarque de Mr Freind qui sent bien un homme peu instruit de la langue Françoise.* If I should be told, that my assertion smells as strong as any expression of Dr Freind's, of a man who is ignorant of the French language, I must say that Dr Freind was not in such a great mistake, notwithstanding the use and custom of all the *Garçons* and *Compagnons* of the Hotel Dieu.

I affirm this with great confidence, because Mr Garengeot is of my side; for, in copying Dr Freind, without acknowledging him, he has explained both sorts of dropsy depending on the same cause, and produced in the same way, only the cavity of the abdomen is the place where the *serosité* is poured out in the one case; and p. 39. "it is *epanché et infiltré* "into the fatty cellules in the other." Whether then is not a distinction of names unnecessary, by which neither the manner of a disease forming, the causes on which it depends, nor the seat of it are distinguished? and therefore is it not right to say, that, if *infiltration* is a word at all, it is not justly applied here, and conveys no idea? It is Mr Garengeot's busi-

ness

neſs to ſhew that *infiltration* is French; I know *filtrer*, *filtration*, are French, as *filtre*, *filtrate* are Engliſh; but I am not ſo well perſuaded of *infiltrate* being uſed by any ſtandard author of either language.

The objections unworthy of a ſchool-boy were made by Dr Freind to an account of the ſyncope after tapping, formerly aſſerted by Galen *, and repeated by Aquapendente †, and now as fondly embraced by Mr Garengeot, as if it was the genuine production of his own profound meditations. I ſhall not take on me to determine how far either the Doctor or Mr Garengeot is in the right or wrong; but I think it is evident, Mr Garengeot has not refuted Dr Freind's opinion, nor ſufficiently proved his own. To ſhew the falſity of Dr Freind's account of the ſyncope, it was neceſſary to have brought good proof of no effuſion of new ſeroſities into the abdomen happening after the paracenteſis, which our author does not attempt; and he has taken very effectual care to diſprove his own opinion of that ſymptom depending upon the diaphragm being pulled down by the weight of the liver; for he has expreſsly ordered the patient to be put in a lying poſture, and has beſtowed two plates to ſhew him in that attitude, when the tapping is performed. If Mr Garengeot had vouchſafed to conſider, that, when one lies horizontally on his back, the hypochondria are the moſt depending parts of the abdomen, and when we lie on either

* Comment. in Hippocrat. aphoriſm. § 6. aph. 27.
† De chirurg. operat.

either ſide, the hypochondriac region of that ſide is loweſt, he would readily have diſcovered, that ſince, according to him, the liver and other viſcera are not determined by any other power to any particular ſituation, but are left after tapping to act by their own gravity only, they would have no ſuch effect as he alledges, when the patient lies either on his back or right ſide; and, if he lie on the left ſide, the liver would only pull the right ſide of the diaphragm, where the pericardium is not fixed to it. Thus it is to be a moſt ſubtile anatomiſt; ſuch groſs things muſt eſcape one who is judiciouſly employed in counting every little production and doubling of a cobweb *, while others of a much lower rank than Dr Freind muſt be content to take up with obſervations *qui ſautent aux yeux*, that obviouſly ſtrike the eye.

But further, it ought to be remarked, how much our author ſeems to differ for once from the principal, I had almoſt ſaid the only perſon he has any extraordinary regard for, who, in p. 392. of this ſame firſt volume, accounting for hydropic people being like to ſuffocate when they lie, ſays, "Les malades etant couchés, "les eaux qui ſont dans le ventre font autant "d'effort en haut qu'en bas, ce qui pouſſe conſi- "derablement le diaphragme dans la poitrine" If the waters can, as he ſays, make as great an effort upwards as downwards in this lying poſture, is not the diaphragm as low as the navel

* See deſcription of the peritoneum in the ſplanchnology.

navel and hypogaſtric region? and, ſince all bodies acting by their gravity naturally tend to the depending part, ſhould not the liver, &c. puſh the diaphragm conſiderably into the thorax, as well as the waters do? The contrary of which Mr Garengeot has aſſerted to be true, though he had (p. 154.) brought an obſervation of Mr Winſlow that proves the deſcent of the liver in an erect poſture, and conſequently its aſcent in an horizontal ſituation.

Among a great many paſſages where our author with equal juſtice refers to his ſplanchnology, there is one on the ſubject of this diſpute which appears ſingularly curious, (p. 427.) His principal argument for proving the liver's weight capable of diſturbing the action of the heart, is founded on the conoid figure of the pericardium, which, ſays he, "j'ai fait ainſi gra-"ver le premier dans ma ſplanchnologie." That he ſhould be the firſt who cauſed the pericard to be engraved of a conoid figure, is a ſurpriſing diſcovery; pray, gentlemen, what is the figure of it, as it is repreſented in Veſalius, Euſtachius, Bauchinus, Bidloo, Cheſelden, Heiſter? I can ſcarce admit an apology offered here in behalf of our author, by ſome of my fellow-prentices, *viz.* That the text of theſe books being Latin or Engliſh, they are not to be ſuppoſed of Mr Garengeot's acquaintance; for theſe gentlemen have certainly forgot that the language of pictures is univerſal.

Mr Garengeot gives another ſtrong hint, in a line or two after, of ſuch another diſcovery: "For, ſays he, if the heart is ſituated "tranſverſely in that membranous baſe, as I

"have

"have demonstrated beyond all doubt." Truly I believe the transverse position of the human heart has not of a long time been called in question.

A propos of our author's splanchnology, to which we are so often referred, *voila* another manner of making references to it, which our author might, for some certain reasons, have expected would some time or other be pointed at, and that is, to turn up in the splanchnology the descriptions of such parts as are said to have been demonstrated publicly many years ago, or before 1727 or 1728, by an author who is above all exception as to his veracity and *prisca fides*, I mean Mr Winslow, in the 4th and 5th volumes of his *Exposition anatomique de la Structure du Corps humain*: Where the descriptions are alike, let a *nota* be put on the splanchnology, and then number the remaining discoveries in it, you'll certainly after that admire several remarkable qualifications of Mr Garengeot. Lest you should think me to have mistaken Mr Winslow's design, allow me to refer to one of the best judges in anatomical matters, who has been at some pains to explain the private history of the splanchnology, *viz.* Heister, edit. 4. *Compend. anat. monita in splanchnolog. Garengeot.*

Another passage in Dr Freind's book, where our author seems to think the Doctor's ill humour at his confinement may have tempted him to do Mr Garengeot injustice, is in the preface to the 1st volume: "The sheets which "treat of an inguinal hernia were printed off, "says the Doctor, before I had seen the tran-

"slation

" ſtation of Mr Garengeot's ſurgery, who is the " only writer, I know of, that has taken no- " tice of a crural rupture; however the ſub- " ſtance of what is here ſaid on that ſubject " was explained in a public auditory fourteen " years ago." What cauſe of offence ſhould be contained in theſe words, I was at a loſs for ſome time to diſcover; but, after being better acquainted with the genius of my author, I found an unpardonable fault in Dr Freind, to allow his book to be printed before he knew of Mr Garengeot's, or to pretend to have any notion of this diſeaſe without being taught it by this gentleman; at leaſt, the Doctor ſhould not only have given him the honour of being the firſt who wrote on the ſubject, but ought to have acknowledged *qu'il a eté bien au dela*, (p. 261.) which I would interpret, That he was as far from the honour of the diſcovery, as he would perſuade us the ſubſtance of what he ſaid was beyond what the Doctor has wrote on this ſubject.

Mr Garengeot's hiſtorical account of the diſcovery of a crural rupture, is certainly a moſt exquiſite maſter-piece of learning and criticiſm; he ſays, (p. 240.) " If the crural her- " niæ are not found deſcribed in books, except " in two antients;" and in the next paragraph he quotes theſe two antients, Paul and Barbette: Would not one think, by our author's coupling theſe two together as antients, that he leaves us at ſome loſs to know whether by Paul he means the apoſtle, or one of the *principes artis medicæ*, or if both paſſages are from Paul Barbette. The difficulty there is of purchaſing

any

any of the three in French at Paris increaſes the ſuſpicion. But to ſhew you how favourably I would wiſh to explain Mr Garengeot's words, I ſhall allow him to have learned from the French tranſlation of Dr Freind's hiſtory that there was ſuch a man as Paul of Ægina, and then you know there is nothing in a *maitre des arts* bringing under the ſame claſs one perſon who lived in the end of the laſt century, and another who flouriſhed a trifle of ten centuries or a thouſand years before. Let us therefore ſuppoſe ourſelves extricated from this trifling piece of chronology: There is, I muſt own, ſome difficulty to reconcile what our author writes in general of theſe two ancients and his account of Paul's words; for firſt, according to him, "The two antients ſay very little, and "expreſs themſelves very confuſedly;" And afterwards he introduces "Paul an antient chi-"rurgical operator ſaying, That the gut may be "puſhed into a cavity of the thigh betwixt the "pectinæus and ſartorius muſcles, where the "crural veſſels deſcend." This is not ſaying much indeed, but is plaguily plain; and therefore our learned author, to ſhew this to be an incomplete and confuſed deſcription, ſubjoins, (*p.* 241.) "Paul's remark is true, but the diſ-"eaſe is not at ſuch a height except in antient "crural herniæ." No leſs ſure than a maſter of arts could have contrived ſuch a maſterly ſolution of this difficulty.

Tho' at firſt view this argument may ſeem to be exhauſted, yet I imagine this profound anſwer of our author would not be worſe for ſome aſſiſtance, which, with all the humble de-

ference that even Mr Garengeot can expect, I shall endeavour to give it. In the *1st* place then, being supported by the true spirit of a critic, I suspect some interpolation in the text from which our illustrious author has copied this passage of Paul, for *pectinée* and *conturier*, (sartorius) or words of the same meaning in any language, were not used as names of muscles till long after Paulus Ægineta. *2dly*, The whole passage is spurious, Paul not giving the least hint of his knowing any thing of this disease. *3dly*, The plain reason of this historical essay being so embarassed is, that Mr Freind, among his other *vetilles*, took the whim to write an account of crural herniæ when he was treating of Paul of Ægina, and that for no other reason forsooth, but because this same Paul seemed to know more of the other herniæ than his neighbours; and the said Mr Freind stuffed this account with words of his own, and three or four more Barbarians, whose names, if all put together, would not exceed *René Jacques croissant de Garengeot* without the titles; and therefore the whole story could not be understood otherwise by our author than as a copy of the man's words whose name was prefixed to this part of the discourse. It is true there is a passage in our author which seems to imply some contradiction to this apology of mine; for (*p.* 248.) he says, "Mr Freind pretends that "there is only the intestine which forms the "bubonocele." I suppose he gathers this from these words of the Doctor's history, (*p.* 166.) "Paulus says, that a bubonocele always pre-"cedes an enterocele." But this is only done by

by Mr Garengeot with a design to balance accounts; for, in the former remarkable passage, he had borrowed from Freind to give to Paulus, and in this he compliments the Doctor with a passage of the Grecian, which you must acknowledge to be a notable instance of *summum jus*.

You see how handsomely Mr Garengeot has acquitted himself in the dispute with Dr Freind: But these proofs of his skill in argument and criticism, scarce deserve to be compared with the many notable discoveries in languages, physics, botany, chemy, pharmacy, anatomy, animal oeconomy, surgery, medicine, &c. &c. to be met with every where in his books; it is a pity some able hand does not undertake to set them in a due light: I neither dare presume to be equal to such a task, nor can expect you would allow such a work a place in your collection, but beg for once to be indulged, while, among such a great variety as almost makes one at a loss to know what to chuse, I point out one example or two of each sort of learning that occurs in the same volume in which *les vetilles du Mr Freind sont relevées*.

[We must here stop this young man's career; he has done with the defence of Dr Freind, which was the only motive we had to allow any part of his paper to appear, but, among the great heap of ill-natured remarks that we suppress, there are two or three observations which may be of some use; and, for this reason, we shall

take the freedom to ſtrip them of their jocular air, and to communicate them in a plain dreſs.]

The rule of beginning to ſtitch a tranſverſe wound of a muſcle or tendon on the ſide where the greateſt contraction of the muſcle is to be expected, is, according to our correſpondent, unneceſſary, if not hurtful; becauſe the paſſing of the needle and thread through that lip of the wound irritates the muſcle to contract, and conſequently, in the time that the other lip is in piercing, the firſt one will be retracted conſiderably from it, and hence there will be a greater difficulty in bringing them together, whereas, if the more contractile ſide was laſt of being pierced, the two might be brought together, and the threads tied without their being allowed to ſeparate far.

He is of opinion, that a ſmall compreſs of linen, or a piece of rolled taffetas put betwixt the knots, by which the threads are ſecured in an interrupted future, do no ſervice, and, on the contrary, gall the parts on which they reſt.

He concludes his paper with theſe words: By bringing one example of each author, quoted by Mr Garengeot, you will not now doubt how far his knowledge and candour are to be depended on; but I have been thereby tempted to make my paper longer than I deſigned; all I can ſay for myſelf is, that this article of his learning deſerved moſt to be conſidered, becauſe better judges than I ſeem to have thought it his fort, when they aſſigned him the office of making extracts of books; which extracts

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are to be published under the name of no less than an academy. After his talents in this way are set in their proper light, these gentlemen may possibly find it necessary to make a nicer scrutiny into this and the other branches of that great work, wherein the chirurgical academy lately instituted, and otherwise so well calculated for the improvement of surgery, is engaged; in which I wish them all imaginable success, and hope they will think good manners and accuracy no unnecessary qualifications to recommend their labours to the

XXV. *An ESSAY on the Improvement of* Medicine; *by Dr* JOHN DRUMMOND *senior, late President of the Royal College of Physicians in* Edinburgh.

IT is by accurate observations and just reasoning upon them, that physic can be brought to any degree of perfection; one of these is by no means sufficient for the purpose: The greatest masters of reasoning have often proved the most unsuccessful interpreters of nature, by neglecting to consult nature itself, and overlooking the most obvious phaenomena. Aristotle, with all the advantages of a great genius, and most uncommon opportunities of improving philosophy and physic, made no better use of these, than, from some abstract notions of matter, and certain fictitious elements and qualities, to account for the appearances in nature; and, fancying some chimerical

analogy between macrocosm and microcosm, between the political and animal oeconomy, endeavoured to make all things chime to this whimsical hypothesis. Physicians soon adopted Aristotle's notions, and reasoned from the same principles; for many ages nothing was to be heard in the schools but wrangling and disputes about words, useless divisions and distinctions of qualities and forms, and various glosses and interpretations of Aristotle's and Galen's writings: Not one dreamed of searching out the truth, of confirming or disproving any doubtful opinion by exact and careful observations of facts, but relied entirely on the authority of their masters; the study of the institutions then in vogue, either confirmed so many wrong-heads, or made others mere empirics, not finding any certainty in the doctrines of the schools to establish a reasonable practice upon.

The chymists indeed threw off the yoke of the school-philosophy, and pretended to establish a new theory upon experiments, but these were few and very much wrested and misapplied; their fondness for some discoveries made by the help of fire, led them to quite neglect all other useful inquiries into the structure of the human body, the nature and properties of the liquors contained in it, and the laws by which they moved, and hurried them on to an extravagance beyond example, imagining such principles of action and such violent motions as are altogether inconsistent with the life of an animal.

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When the ſtudy of the mathematics was revived in Europe, then indeed might have been expected a thorough reformation of phyſic, and greater certainty than had hitherto obtained: *Des Cartes* ſoon attempted to apply mechanical reaſoning to the animal oeconomy; but, though he had a profound knowledge of the mathematics, for thoſe times, yet, wanting a perfect ſkill in anatomy, and a ſufficient number of certain obſervations, he framed hypotheſes to himſelf which were productive of many blunders.

[illegible] notable mathematicians after him have ſucceeded no better in their attempts, merely for want of ſufficient care to aſcertain the data on which their reaſoning is built; and too frequently it has happened, that thoſe who are maſters enough of the mathematics have not had time, opportunity, or genius for nicely obſerving the facts on which they were to reaſon, and others of a quick imagination have argued themſelves into a belief of facts, contrived in their own brains, being real and true, becauſe forſooth ſo much fine reaſoning could never follow from a falſhood; ſo that, however abſurd we may think Ariſtotle's monarchical deſpotic government of the heart, or Des Cartes's flaſhes of fire contained in the parenchyma of that bowel, there are not wanting of their ſucceſſors who have not been much more modeſt in their poſtulata.

On the other hand, many of the gentlemen who have employed themſelves in making obſervations of facts, were utterly incapable of putting them to the right uſe, nor have they

taken

taken care to represent them in such a way as to be useful to others.

Your design, gentlemen, has the appearance of removing the difficulties that thus retard the improvement of physic, and I hope will introduce reason and experience united in perfecting this art; with a view to promote which, I take the liberty to submit some things to your consideration, which I have observed either very much to obscure and confound our conceptions about the genuine nature of distempers, or to seduce the unwary beginner from the rational method of practising, and to offer [illegible] censure some hints for redressing these mistakes.

The complaint which Galen makes of the physicians in his time distinguishing too nicely the species of some diseases, rather for pompous names than for any advantage to medicine, is much more justly to be made now, when it has been the misfortune of this art to be loaded with such numbers of names to each disease, and such minute and subtile distinctions of them, by which a beginner, on viewing a catalogue of distempers in some of the systematic writers, will be apt to imagine, that each name denotes a disease very different from any other, and that he must learn a particular method of cure adapted to each; whereas, if the matter was duly considered, it would appear that these numerous lists might be much abridged, by reducing many diseases to the same class or general head. It is, indeed, scarce possible to find two cases in any disease strictly parallel in every circumstance; but it would

would be ridiculous, from every accidental circumſtance in a caſe, to diſtinguiſh it with a new name, when the principal ſymptoms, which deſerve moſt our attention, are the ſame in innumerable caſes, and ſhew that they have the ſame common cauſe, the ſame general indications, and therefore ought to be reduced to the ſame claſs. Undoubtedly it would be of great uſe to ſtudents of medicine, or young practiſers, to accuſtom themſelves to form ſimple and diſtinct ideas of diſeaſes, and in their firſt conſideration of them, to ſet aſide the leſſer differences and accidental circumſtances, and to ſearch out that which is of moſt conſequence in any diſeaſe, and wherein it agrees with moſt others. Some examples will perhaps ſerve to illuſtrate what I mean.

Authors diſtinguiſh an hæmoptoe into a great many ſpecies, ſuch as anaſtomoſis, diaireſis, diapedeſis, rixis, and diabroſis, and write a great deal of the different cauſes of thoſe hæmoptoes, and of the ſigns by which they are to be diſtinguiſhed; which, however, are of very little importance: On the contrary, it would be more for the advantage of a beginner, to conſider a haemoptoe ſimply as a preternatural flux of blood, and as ſuch it agrees with the hæmorrhagia narium, vomitus ſanguineus, diarrhœa cruenta, hæmorrhoides, mictus cruentus, profluvium nimium menſium, &c. all which have the ſame immediate cauſes, the ſame effects and conſequences, and ſuggeſt the ſame indications of cure, viz. in the beginning, the quantity of blood muſt be diminiſhed, and a revulſion made by opening a vein in the arm,

foot,

foot, &c. the velocity and rarefaction of the blood muſt be moderated by cooling medicines: And, laſtly, the dilatation or rupture of the veſſel muſt be contracted and ſtrengthened by aſtringents. It is true, that the ſituation and function of ſome parts, from which the blood flows, makes the diſeaſe more dangerous, the application of remedies more difficult, and their effects leſs certain in ſome hæmorrhagies than in others; yet the ſame method muſt take place in all; and therefore the general title of this claſs of diſeaſes ought to be *hæmorrhagia*; and it would be as needleſs to treat of each of them as a diſtinct diſeaſe, as it would be to diſtinguiſh the rheumatiſm into as great a variety, becauſe it ſeizes on the neck, arm, hand, leg, foot, &c.

Fevers have been treated of in large and numerous volumes, and have been diſtinguiſhed into many ſpecies: Riverius reckons above thirty different kinds of this diſeaſe, and Sydenham has increaſed them to double that number; but certainly thoſe authors and all other phyſicians have obſerved ſomething common to all theſe diſeaſes which made them denominate them fevers. The conſideration therefore of this which conſtitutes a fever, (which upon examination will be found very ſimple and obvious), with its true cauſes and genuine effects, will give one a more juſt and clear notion of the diſeaſe, and lead him to a more rational practice, than all that has been ſaid at ſo great length on thoſe ſubtile and unneceſſary diſtinctions, which one would be almoſt tempted to believe had only been made by obſerving

ſerving the ſame diſeaſe in different perſons: And, in this view alſo it will appear, that the moſt natural and uſeful diviſion of fevers is into continued and interrupted; for I humbly conceive they may all, when conſidered ſimply, and not as the effect of another diſeaſe, be reduced to one or other of theſe two ſorts.

Ophthalmia, angina, phrenitis, peripneumonia, pleuritis, hepatitis, nephritis, rheumatiſmus, &c. have all the ſame characteriſtic, and differ in nothing but the part affected; ſo that, if one has a right knowledge of an inflammation of the external part, its progreſs and proper remedies, and, at the ſame time, is thoroughly acquainted with anatomy, and the animal oeconomy, he cannot be at a loſs to diſtinguiſh and treat any of the diſeaſes belonging to this claſs.

Carus, cataphora, or ſubeta Avicennæ, lethargy, coma vigil, or typhomania Galeni, palſy, paraplegia, hemiplegia, &c. are nothing but different ſpecies of the apoplexy in a leſſer degree.

Anaſarca, leucophlegmatia, hydrops aſcites, tympanites, hydrocele, &c. differ ſo exceedingly little, they ſcarce deſerve the retaining ſo many pompous Greek names.

Some authors have diſtinguiſhed diſeaſes from their cauſes, though theſe do not, in the ſuppoſitions they make, alter the ſymptoms or method of cure; as for inſtance, Morton reckons among the ſpecies of phthiſis thoſe proceeding from diarrhœa, dyſentery, gonorrhœa, hæmorrhagy, dropſy, and from forty other diſeaſes; and perhaps there are thouſands of remote cauſes more, which can produce a conſumption, without varying

ing the common immediate cauſe of the diſeaſe, or the method of cure; and therefore needleſs to be enumerated.

Theſe few examples may ſerve to explain what I intend, by propoſing to reduce diſeaſes to a few general heads, and may poſſibly give the hint to ſome abler pen to undertake a thorough reformation of uſeleſs names, to which, if they pleaſe, to tack receipts of extravagant length, where it is ſcarce poſſible to determine to what purpoſe moſt of the ingredients ſerve, except to increaſe the bulk of the compoſition, I am perſuaded they would very effectually promote the art of healing.

Tho' I would argue for the uſefulneſs of abridging the numerous names of diſeaſes, and of reducing the unreaſonable farrago of medicines in preſcriptions, yet I would earneſtly exhort all phyſicians to beware of falling into the oppoſite fault of preſcribing, when they have only learned the general name of the diſeaſe, without having exactly and carefully examined all the circumſtances both of the patients, and their diſeaſes; for I am convinced, there is ſo little hope of obtaining any univerſal medicine to cure all diſeaſes, that there is not any medicine proper for any one diſeaſe in all ſtages of it, and to all patients, except, perhaps, in preventing the effects of ſome poiſons, of which we know no more than that ſome particular antidotes have done ſervice; ſuch is the ſalt, or rather the axunge of the viper, to the bite of that animal; and therefore your caution, gentlemen, in the article of your ſcheme concerning the hiſtories of morbid caſes, is certainly

certainly just and necessary; for, without the patient's age, sex, constitution, &c. and the symptoms and circumstances of a disease are related, the observation is of little or no use; since practising by rote has no fairer chance for curing, than a blind man has to strike a dog, who stands barking at a distance: And this it is that principally must distinguish between a rational physician and a pretending empyric. As a proof of this, I shall cursorily mention examples of some of the most common diseases, where a particular form of practice generally prevails, and shall chuse out such as serve to illustrate the several necessary circumstances taken notice of in the article of morbid cases above mentioned.

Suppose two persons seized with an apoplexy, one is a full bodied vigorous young man after a debauch, the other is an old feeble person, long subject to Catarrhs, I presume blooding very plentifully must be the principal thing depended on for the cure of the first, and that this method would very effectually destroy the other, who must be treated with every thing that stimulates.

A rigid old man, and a healthy young boy, are both seized with an inflammation tending to a gangrene in their extremities; evacuations and topical emollient applications are proper for the boy, cordials and topical antiseptics for the man.

A man and a woman of middle age, healthy and vigorous, are, without any previous remarkable symptom, taken with a small hæmoptoe; the man is let blood of plentifully, is kept cool with a low diet, and has astringents given

him; the woman being near the time of her menſtrua, is to have this natural evacuation forwarded, which proves her cure.

Two perſons of the ſame ſex and equal age, but one brought low by a diſeaſe, the other plethoric, catch an ague at the ſame time. The plethoric perſon requires to be blooded, and by other evacuations to have his veſſels emptied; the other muſt be ſupported by a nouriſhing diet and cardiac medicines.

Two men of equal age and ſtrength, one of whom has lived temperately and ſoberly, the other has every day drunk two or three bottles of wine at leaſt, are both ſeized with a fever; the firſt is kept ſucceſsfully at cooling emulſions, the other muſt have an allowance of wine; for, uſe them in there verſe way, the temperate man will have his fever unſufferably raiſed, the other will become quite diſpirited.

A child has complained of pains in his belly, ſhrieks frequently, grinds his teeth in his ſleep, and has formerly paſſed worms by ſtool; a man has been ſeized ſome hours with a fever. Both fall into epileptic fits, which are to be cured in each by removing their cauſes; and therefore require very different treatment.

Two perſons brought low, one with a fever, the other with a palſy of ſhort ſtanding, take each a quotidian or tertian ague; the firſt is to have his ague ſoon ſtopped; the other is to bear the ague as long as poſſible.

One man has been nigh exhauſted with loſs of blood, another has lived too fully for ſome time; both after exerciſe complain of a great anxietas and difficulty of breathing, with a faintneſs,

faintneſs, inability in their limbs, and trembling all over their body; their pulſes do not beat ſtrong, and all the perceptible difference is, that the arteries of the latter feel hard and firm like a cord, while the former's pulſe is ſoft, and makes no reſiſtance; though the appearances in both are the ſame, yet this laſt circumſtance, and the preceding hiſtory, determine the diſeaſes to be exactly oppoſite; the one is from the emptineſs of the veſſels, the other from a plethora; and the method of treating them are directly the reverſe of each other.

No rule is more general than that of blooding in pleuriſies; but ſuppoſe a phyſician called in the fifth or ſixth day of the diſeaſe, and ſees the patient coughing up pus, blood-letting is ſo far from being requiſite, that it is hurtful.

The common practice in the beginning of the ſmall-pox or meaſles is to let blood; but, if the exanthemata are pale, the patient's pulſe low and ſlow, without any oppreſſion at his breaſt, cardiacs are of ſervice, and evacuation by venæſection dangerous.

Authors ſeldom miſs to diſcharge drawing of blood in a dropſy, yet ſuppoſe a ſtrong man, after over-heating himſelf, and drinking great draughts of cold drink, to have his belly ſuddenly diſtended with water; and upon this to have a great difficulty of breathing, and all his veins very turgid, he muſt be blooded, otherwiſe his diſeaſe will increaſe, and the circulation of the blood in the lungs will at laſt be entirely ſtopped.

To cure the jaundice ſafely in a plethoric perſon, eſpecially if attended with an inflam-

mation of the liver, it is neceſſary to begin with taking blood, contrary to the general rule in this diſeaſe.

In the ſame manner, violent hyſteric ſymptoms, occaſioned by the over-fulneſs of the veſſels preventing the menſes to flow, are only to be removed, and the menſes to be brought on by blood-letting, notwithſtanding the general maxim of making no evacuation of blood at this critical time

I am afraid to be tedious, otherwiſe I could multiply examples of the ſame kind. In ſhort, name any diſeaſe, and what medicine you pleaſe as univerſally uſeful in it, and I can promiſe to ſhew circumſtances of patients, or of the diſeaſe, where that medicine would be very improper: Therefore let me intreat you to inculcate ſtrongly to your correſpondents, to conſider well the caſes of their patients, to leave the way of practiſing only in a routine, or by rote, to thoſe who ſcarce deſerve the name of empyrics, and to lay the foundation of their preſcribing on experience and reaſon united; for of theſe it may be ſaid as Horace did of art and nature in poetry,

Alterius ſic
Altera poſcit opem res et conjurat amicè.

XXVI. *An*

XXVI. *An Ulcer in the Lungs, piercing through the* Diaphragm *into the Liver; by Dr* EDWARD BARRY, *Phyſician at* Cork *in* Ireland.

AT the deſire of Mr More ſurgeon to Colonel Groves's regiment, I viſited one of his men, who, ten weeks before, had been ſeized with a peripneumony, attended with a pain in the lower part of his right ſide, that never was acute, but terminated in an abſceſs, and ſoon after broke. The pus which he expectorated when I ſaw him was very foetid; and, by lying on the oppoſite ſide, was diſcharged in a greater quantity. His body was much emaciated by frequent colliquative dejections, attended with a perpetual naúſea. As he thus appeared to be in the laſt ſtage of the diſtemper, it was in vain to propoſe any method of cure.

About a fortnight afterwards, I was preſent at opening his body, with ſeveral other phyſicians and ſurgeons.

We found a ſtrong adheſion of his lungs to the pleura, where he had a frequent pain, and to the diaphragm. Examining into the purulent cavity, which lay immediately under the ſurface of that adhering part, we found it continued through the diaphragm about an inch deep into the gibbous part of the liver, which cloſely adhered to the diaphragm. The length of this ſinus was about ſix inches, and its diameter in the liver was about three, but more narrow in the lungs. The reſt of the lobe of the lungs was entirely ſound.

XXVII. *A Tumor in the* Oesophagus *from a singular Cause; by Dr* GILBERT WAUGH, *Physician at* Kirkleathem *in* Yorkshire.

A Farmer named ——— Hart, in the village Micklebee, had a daughter violently afflicted with fits; which, from their surprising nature, were judged by the neighbours to be the consequence of witchcraft: So that her parents were a long time in suspense whether they should call to her assistance a clergyman or physician; but at last they agreed to call me.

This girl, about seventeen years old, though lean, appeared to be in good health, and went about the family-concerns chearfully. Upon asking the relations at what time these wonderful fits, of which I received so terrible a description, would seize her, the mother brought the girl a draught of fair water, which she attempting to drink, was seized with violent convulsions, and at last fell to the ground as dead. In about half a quarter of an hour, she began to speak, complaining of an intolerable pain in her breast, and a weight upon her spirits, or anxiety which she could not express, and with her finger pointed the part affected, which was under the upper part of the sternum, where it is joined with the clavicles. I could discover no signs of inflammation or tumor there; but she insisted there was cause of complaint, though it lay out of my sight, and assured me that for the two last months she had taken

taken no food, even the moſt ſlippery, without ſuffering fits of the ſame nature with what I had ſeen, but that of late they had grown worſe. Inquiring what health ſhe had enjoyed before theſe two laſt months, I was told ſhe was then afflicted with a violent quinſey, accompanied with a high fever; and, when they expected that every minute ſhe would be ſuffocated, the ſwelling about her throat ſuddenly diſappearing, ſhe was relieved in a great meaſure; but was ſenſible of a painful weight (as ſhe expreſſed it) remaining in her breaſt, at the place ſhe had pointed before, and from that time deglutition had met with ſome obſtacle, which had daily grown worſe. To this relation of the young woman, the parents aſſented.

I concluded this obſtacle to be from a tumor, the conſequence of the ſudden tranſlation of the inflammatory matter from the fauces to the coats of the œſophagus. I was alſo ſenſible of the difficulty of attempting any thing to purpoſe, till nature ſhould point out the way; but, as this concluſion would not be ſatisfactory to the relations, and I might appear negligent of my patient, I ordered a mild vulnerary decoction for drink, and an emollient fomentation for the breaſt. In ſhort, in leſs than three days, the tumor broke, and the poor girl was almoſt ſuffocated with the ſtench and quantity of the purulent matter. Her parents very reaſonably gave her a good quantity of warm water to drink; ſo, by ſtraining to vomit, all the pus was ſqueezed out of its cyſtis; and, by vomiting, her ſtomach

was

was relieved from what might have occasioned a diarrhoea, or worse, and she is now quite well.

XXVIII. *Spasms in the* Oesophagus; *by Mr* James Aird, *Chirurgeon-Apothecary in* Cumnock.

ROBERT AIRD younger of Crosflet, aged eighteen, a strong well-made youth, troubled frequently with an itchy scurf on his skin, complained of colic-pains in the beginning of the year 1724, which grew violent early in the spring. They were attended with the following symptoms.

He was costive, and his spittle tasted salt or bitter for two or three days before the attack. His skin became free of the itch, and smooth on the approach of the fit. A violent drought arose, and an inclination to yawn, but he could not yawn freely. A pain and swelling began in the umbilical region, reaching upward to the stomach and both hypochondres. He had a violent head-ach, and reaching to vomit, accompanied with strong shivering all over his body. He threw up at some times bilious matter, and at others a saltish rheum. At last a stupor seized sometimes his legs, sometimes his arms, and sometimes both, during the paroxysm. His urine was clear and copious while the fit lasted, but turned turbid and red after it was over.

The first appearance of the declension of the paroxysm was a sweat trickling down his face, with an ability to yawn freely.

I was called to him in the second of these violent fits, in the beginning of March, about twelve at night. It had begun betwixt three and four afternoon, and was attended with all the above symptoms. I immediately bled him plentifully, which gave present ease: Next day he was vomited, and, with an intermission, purged once and again; which, with a regular diet, probably kept him free from any attack for some weeks.

In the month of April, he was seized with a dangerous fever, with starting of the tendons, &c. which lasted fifteen days, but went off by a plentiful sweat, and he continued well till

Thursday the 25th of May, when, after being three days costive, he was seized with another fit of his colic pains, more severe than any of the preceeding. All the symptoms formerly mentioned raged most violently, particularly the vomiting, with shaking and shivering to such a degree, as three strong men could hardly keep him in his chair. It lasted from three afternoon, till near midnight, and then went off of its own accord: But, on the paroxysm's declining, he was entirely deprived of the power of deglutition, so as he could not swallow the least bit of meat, or one drop of drink. He had a sharp drought, and some faint inclination to eat. He complained of a pain at the pit of his stomach, and on the left side of his throat. Being abroad, I did not see him till next day.

Friday's afternoon, I came, and found him feeble, yet able to walk about, and thirsty, but

but not able to get over the leaſt drop of liquor, which he attempted frequently, but with ſo much pain, reaching to vomit, and threatning of being convulſed, that he was forced to give it over.

On Saturday the 23d, he continued in the ſame melancholy way. A phyſician, who had been ſent for, arrived that afternoon, and left orders for a clyſter, with the emollients and lenitive electuary, a tepid bath of milk and water, and a *S. Q.* of the following cataplaſm, to be applied to the pit of his ſtomach, neck, and jaws:

℞ *Theriacæ Venetæ, unc.* ii. *Pulv. fol. menthæ, drach.* iii. *Pulv. ſem. abſint ii. drach.* i. ſem. *Ol. macis per expreſſ. drach.* ii. ſem. *Spir. vini camphor. unc.* ii. *Vini clareti q. ſ. ut f. cataplaſm molle.* And, if theſe things reſtored his deglutition, to perfect the cure a vomit, and a *S. Q.* of the following infuſion, to be given *diebus alternis*, ſo as to procure three or four ſtools extraordinary:

℞ *Pulv. rhei elect unc.* ſem *Fol. menthæ, pug. j. Sal. abſinth. drach.* ſem. *Spec. hieræ picræ, drach.* i. *Aq. cinnam. ſ. v. lib.* ſem. *Agitetur phiola ſæpius per triduum, & f. colatura turbida.* drinking whey, water-gruel, or chicken-broth, an hour after it.

While I was gone to cauſe the medicines to be prepared, a lady in the neighbourhood perſuaded him to attempt ſwallowing down ſome delicate gelly or marmalad. He twice endeavoured to do it with great reſolution; but his courage coſt him ſo dear, through the violence of pain, horrible nauſea, reaching and convulſion

vulſion of the parts, that he gave up any further trials. And no wonder, for he was not only ſore ſpent, but, by the violent contractions of the abdominal muſcles, he had forced the gut into the ſcrotum. This was immediately reduced, and he was laid to bed in a very hopeleſs way.

Sunday the 24th, he continued in the ſame way, without being able to get over the leaſt drop or bit of any thing; neither indeed did he much attempt it, though he had no hydrophobic averſion, for he frequently waſhed his mouth with whey, but durſt not gargle his throat, or endeavour to ſwallow any of it. At laſt, when he was brought very low, about ſeven at night, the medicines arrived from a very diſtant place. The cataplaſm was immediately applied to his jaws, and to the fore-part of his neck and ſtomach. In leſs than an hour, he could ſwallow a little drink; and, before ten at night, he could take down both victuals and drink. He was nouriſhed with whey and chicken broth, and paſſed the night pretty eaſily; but his ſpittle continued to be very bitter.

Monday the 25th, he complained of little, except the taſte of his ſpittle and weakneſs; on account of which I delayed giving him the vomit, and the rather that he had a plentiful ſtool, he having had no paſſage by ſtool or urine from Thurſday that the paroxyſm began.

Tueſday the 26th, he got a vomit of emetic wine in the morning, which brought up an immenſe quantity of curdled bilious ſtuff,

by

by which he was greatly relieved: But, obſerving him pained by the ſpaſm in the left ſide of his throat when he reached to vomit, I did not preſs him to continue vomiting, but put him to bed. He had ſome ſtools that and next day.

Thurſday he began to uſe his purging tincture, by which he evacuated great quantities of bilious ſtuff. He took it every ſecond day, till he conſumed double the quantity preſcribed; for he had it renewed, by pouring canary on the reſiduum, which purged him in the ſame manner. The more he purged, the more he found himſelf relieved; and the ſaltiſh and bitteriſh taſte of his mouth gradually went off. After he had purged ſome days, he began (as he uſed to do very frequently in health) to ſweat a little in the night, though he had ſweated none all the time of his illneſs.

After his purging tincture was ended, he uſed ſome corroborating medicines, and was reſtored to perfect health; and has been free from any complaint of that kind now theſe eight years.

As to the hernia, he wore a truſs for ſome time; but as he never had been troubled with it before that fit, ſo he has been free from it ever ſince.

Mr Aird's getting ſo eaſily free of his rupture, will appear the leſs ſtrange, when I tell you of a gentlewoman, my patient, who, by lifting a great weight, from a table to the ground, had, in a moment, a *hernia inguinalis*, that gave her intolerable pain, till it was reduced. She was ordered to ly conſtantly a-bed for ten or twelve days,

days, with a woollen-cloth six or eight fold, wring warm out of a strong decoction of oak-bark and allum, with strong red-wine, pressed close on the part. All the time she was free of pain, and then rose in perfect health, and has since born children without a relapse, or any uneasiness from the rupture.

XXIX. *An Inflammation of the Stomach, with* Hydrophobia, *and other uncommon Symptoms; by Dr* JOHN INNES, *Fellow of the College of Physicians, and Professor of Medicine in the University of* Edinburgh.

A Young gentleman, well made, of a florid blooming complexion, all his life healthy and vigorous, was last summer, on excessive walking in dry hot weather, suddenly seized with a sharp pain at the upper orifice of his stomach, soon after attended with difficult breathing; both which almost as suddenly disappeared on plentiful blooding. Last winter he had some faint returns of the same, but, by gentle evacuations, keeping at home, and moderate diet, he easily got the better of them.

He lived very temperate, much at home, and in perfect health till the end of March, when he could only observe his appetite less, and digestion slower than usual.

April 2d 1732, he went to bed in perfect health, was waked next morning with a pain much like the former, tho' neither so exquisite nor equally sharp, but that he could make a shift to put off with it, and even at some inter-

vals to sleep a little, till ten next morning; when all of a sudden it became so violent, as to force him instantly to call out for his old cure, a plentiful blooding; on which, for some minutes, he thought himself intirely relieved, but soon after complained of a strange anxiety, difficult breathing, coldness of his extremities, and convulsions of the diaphragm.

I saw him before eleven, when I found his pulse much oppressed, very irregular, and often intermitting, his extremities chilled, his breathing almost suffocated, fetching heavy sighs, and very often looking ghastly, spouting saliva frequently, and roaring out from a sharp burning pain gnawing his stomach; and now his pulse at the arm was scarcely to be felt, but at the temples was frequent and irregular.

After some hesitation he was blooded plentifully, on which his pulse became more full and equal, and a new heat was diffused over all his body, the pain remitted, and his breathing became free.

Twenty minutes after, his extremities became cold, his pulse feeble and irregular, his breathing oppressed, and his pain quicker than ever. He was immediately blooded, and seemed for five minutes somewhat relieved; then all of a sudden his extremities became cold and rigid, as of a dead body, his pulse at no rate to be felt; immediately he cried out, that every thing was turning round him with strange rapidity: Soon after that he scarcely saw objects, but imagined himself in such a motion, at last saw nothing; and, quite bereaved of all his senses, raved in the most extraordinary manner,

manner, often ſtarting up and tearing every thing about him, ſpouting perpetually great quantities of water, ready every moment to be chocked in his breathing, making no complaints of his former pain, but crying out in the moſt pitiful manner, how he was abandoned by all, and left among flames that were conſuming him, vowing eternal revenge on all that had ſo uſed him.

The tone of his voice often changed, he had convulſions frequently in his face: At length, as if wearied out with this ſhock, he fell calm, tho' ſtill pretty much inſenſible; at which time, by the concurring advice of two other phyſicians, Drs Robert Lowis and James Eccles, he was plentifully blooded, on which he returned to the full exerciſe of all his ſenſes, (except that of ſeeing diſtinctly) and ſeemingly to good health.

He had ſome intervals during that extraordinary ſhock, and called inſtantly for drink: But the moment he ſaw it, fell into the moſt ſurpriſing horrors, and, as it approached him, ſtarted, looked frighted, had frequent convulſions, eſpecially about his mouth, and peeviſhly put it away with his hands; and then with an air that ſpoke at once fright and reſentment, he would ſtare after the drink, and ſoon after impatiently call for it, and repeated the ſame ſcene.

After this laſt blooding, finding himſelf more than ever before relieved, he called haſtily for a little warm milk and water, he greedily gutted in a mouthful, and that very moment, with great force, ſpouted it at a great diſtance,

and after it an incredible quantity of saliva in the same manner, with the same force and very frequently, telling that, notwithstanding all his burning thirst, to swallow it was impossible; nor could he, without a kind of horror, hear of any kind of drink, otherwise he was pretty easy till five that afternoon, when all the former symptoms recurring (tho' not so violent as last) instantly demanded a fresh blooding; on which becoming easier, he passed that night freer of pain and hard breathing, tho' without sleep.

Towards morning, he attempted often to swallow, and at last got down some drink, tho' with the utmost terror and pain. He had an emollient fomentation applied very warm to his breast and belly when at the worst, and fancied himself much benefited by it; but, as his pulse became fuller, and the natural heat more equally diffused over his extremities, he complained it made him sweat and faint.

From this last blooding, his pulse was soft, full, and slow; he had an equable heat over his body, and a breathing sweat till next morning at nine, when his extremities gradually cooled, his pulse turned feeble, his breathing quick and laborious, and his pain sharp. He was again blooded; but, before five ounces were taken, he fainted; all the symptoms immediately disappeared, his deglutition easy, &c.

Next morning all his former ailments returned, and he was put under the same necessity to blood as ever; on it he was instantly relieved, and continued pretty easy till eleven that night, when all his former mischiefs recurred;

red; he was blooded; but, before three ounces were taken, fainted: The ſymptoms however abated, but returned with double force at five next morning, when he bled freer and without fainting.

All this while it was with much pain he could take a little warm emulſion, not exceeding a ſpoonful at a time.

He had been from the beginning always confined to one poſture on his back, and the leaſt attempt to move himſelf never failed to waken his pain, which frightned him from the uſe of clyſters often recommended.

He paſſed that day much ſunk, weak, and diſpirited, often fainting, till two next morning, when the old ails returning commanded immediate blooding, which he bore better than the two laſt times; after this his pulſe was ſofter, fuller, and ſlower by much than at any time before, and his pain eaſier. All that day he drank pretty heartily his emulſion and a little chicken-broth, till mid-night that he turned very ill, and without fainting bore a plentiful blooding, on which his pain quite evaniſhed, and next morning his pulſe was very near to the natural, and he could now move himſelf without wakening his pain.

He had a diſcutient ſtrengthening fomentation applied, an emollient carminative clyſter with the digeſtive injected which was retained, and another more ſtimulating repeated, which operated very well

He had a retention of urine from an inability to expel it; but, on the ſecond injection and fomenting the perinæum, it went off.

He could now take down any thing without the leaſt pain, his pulſe was come to the natural ſtandard, only he was extremely weak.

At eleven that night, he had a violent reaching to vomit, which laſted half an hour; he ſlept well till five next morning, when an exceſſive vomiting recurred, every thing ſtomachic or anodyne was immediately returned; but, after caſting up a deal of green ſtuff, and on applying very warm cloths to the pit of his ſtomach, the vomiting was ſtaid.

He now began to loath his milk and water, chicken broth, &c. and had in place of them ſack whey a very little ſolid food, veal gellies, &c. and, by this analeptic diet, in a few days, recovered health, ſtrength, his former air, and ſucceſsfully performed a long journey.

In the ſeven days during which this diſeaſe continued violent, the patient had about 116 *ounces of blood taken from him.*

XXX. *Loſs of Appetite, and an Atrophy from the Stomach diſplaced; by Dr* ROBERT LOWIS, *Fellow of the College of Phyſicians at* Edinburgh.

A gentleman about ſixty three years of age of a groſs habit, healthy conſtitution, an regular courſe of living, had from his you been ſubject to an epiplocele: About the e of the year 1722, his appetite for meat beg to fail and his body to waſte; during his i diſpoſition, he had not much thirſt, and w generally

generally coſtive, till ſome weeks before his death that a looſeneſs came, not exceſſive nor accompanied with gripes; towards the end of which, his ſtools had a mixture of ſome purulent matter and a very noiſome ſmell: His urine for moſt part was reddiſh, in ſmall quantity, and let fall a groſs red ground; he never complained of any pain but what was occaſioned by the piles, which went off in a week or two without blooding. About two months before his death, he was ſenſible of a weight upon his ſtomach, in which time alſo he obſerved the hernia to increaſe much, and was troubled with frequent belchings: The three laſt months of his illneſs, he had great watchings; his pulſe was full, ſtrong, ſlow, and hard, and his breathing eaſy and free till a few days before his death.

At the beginning of his indiſpoſition, he uſed no other medicine but ſome gently purging and ſtomachic bitters, fearing that vomits might increaſe the hernia; but, his diſeaſe ſtill going on, about the month of July, he was prevailed on to take a vomit of emetic tartar, and after that ſeveral others at due diſtances and pretty ſtrong, which brought up with much difficulty a quantity of tough, heavy, thick phlegm, by which he had ſome ſhort relief; he uſed likewiſe bitter ſtomachic infuſions with and without purgatives, and alſo ſuch medicines as were proper to mitigate the moſt preſſing or uneaſy ſymptoms. He uſed moderate exerciſe in the country, a regular diet, and aſſes milk; but, his body ſtill waſting, and his ſtrength gradually

dually failing, he died the 25th October 1733. Upon the 27th his body was opened.

The first thing observable was, that, upon cutting the teguments of the lower belly, there appeared little fat, and the fleshy fibres of the muscles were almost entirely consumed.

2. The abdomen being fully laid open, there appeared very little of the cawl, and that reached scarce so far down as the navel, except upon the left side, where more than the half of it had fallen down to the scrotum, and was attached to the lower part of the left testicle, the annulus on that side being dilated so as to admit likewise two or three fingers.

3. By this falling down of the cawl, the stomach, which was very much inflated and extremely thin and smooth, had been pulled out of its natural situation, so that the pylorus tended obliquely downwards almost as far as the right side of the navel; and the gullet entred the stomach at an acute angle.

4. The liver was large, weighing about six pounds, and reached under the left hypochonder, taking up part of that space the stomach should naturally have possessed; upon its surface and through its whole substance were white steatomatous swellings, as also several ulcers, especially upon the concave side.

5. The gall-bladder contained a blackish bile, and the *ductus choledochus* was so large as to admit two fingers where it entered the duodenum.

6. The pancreas was schirrous, but the mesenteric glands were no ways indurated; these and

and every thing else in the lower belly appeared to be found.

7. In the thorax, the lungs were of a blackish colour, and, at the first division of the bronchi in the left lobe of the lungs, there was found a round hard body, about the bigness of a filbert, outwardly as black as ink; but, when the membranous cover was removed, appeared browniſh, and was of a stony brittle substance, like to something he had once spit up in the time of his sickness.

8. The heart was extremely flaccid.

XXXI. *A Tympany; by* ALEXANDER MONRO, *Professor of Anatomy in the University of* Edinburgh, *and* F. R. S.

THE keeping of the register of patients, their diseases, &c. having fallen to my share in the management of the infirmary or hospital for sick poor lately erected here, necessarily obliges me to peruse with care the journal of all the cases treated in the hospital, and recorded by the physicians and surgeons; among which there are several (notwithstanding the small number of sick which the fund of the infirmary is yet able to maintain) that would not be unworthy of a place in your collection of medical observations: I affirm this with more assurance than can generally be done in behalf of hospital-cases, because the journal does not simply contain the name of the patient and disease, the receipts of medicines prescribed, and the time of the cure or death; but the

the preceeding history of the patient and disease, with the particular complaints and symptoms, are recorded at their admission; and every day after, all the changes happening to the sick, with the evident effects of the medicines, are inserted; at the same time the physicians are not confined, in ordering the diet of their patients, to the common fare of the house, but are allowed by the managers to cause whatever food or drink they think most fit to be given; and such of the managers who are visitors in their turns take care that these orders are executed.

Having permission from the managers, I have made an extract from the journal of the following case, only changing the form of a diary, and abridging what I imagine your design does not require, but was necessary in such a record: If this specimen of hospital practice is acceptable to you, your yearly volume may always be supplied with some cases from the same collection.

Margaret Dog, aged twenty two years, was seized with a tertian ague in January 1729, and being then servant in a public-house, had no care taken of her, but was allowed to follow every idle prescription that was offered by any of her acquaintances; among a great variety of very uncommon medicines, she was persuaded to drink great quantities of brandy and powdered pepper in warm ale, which changed the intermitting fever into a most violent continued one, in which she was delirious several days; and, as this went off, the ague returned, but with two, three, four, and some-

times

times five paroxysms in a day, which she often attempted to put away with all the vulgar specifics brought her: The disease however continued obstinately till August, when some doses of the bark were given her; after which she was attacked with sharp pains in her loins and belly, beginning commonly about the right *os ilium*, and rising upwards to cross over by the stomach to the left side, attended with gripes, borborygmi, and swelling of the whole belly; and for some weeks one of her legs trembled, became hot, and sweated at the same hour each day, while nothing like ague was felt through the rest of her body. The pains continuing, her belly became still more distended, and sometimes was stretched in a very short time to a great bigness, and then gradually subsided without evacuations of any kind, but always remained more swelled than ordinary. When winter came, she mended, and was for some time almost free of her uneasy symptoms; but, in the beginning of the spring, her pains and swelling returned, and, after suffering them several weeks, she represented her case to the physician and surgeon then in attendance at the infirmary, and was received as a patient there on the 24th March 1730.

Her symptoms at this time were a more than ordinary constant swelling of her belly, but sometimes increasing so monstrously, that the skin seemed to be in great hazard of being torn; and her breathing was much straitened: The swelling gradually decreased without any evacuation: The returns and degree of this

swelling

ſwelling were very uncertain; and, when the belly was moſt detumified, one could feel ſeveral unequal protuberant balls every where, but eſpecially at the ſides of the abdomen: Her ſtomach was good, ſhe had no thirſt, and her urine was in ſufficient quantity in proportion to her drink. She was very coſtive; her menſes had returned at irregular periods for ſome preceeding months. There was no œdematous ſwellings in her legs, nor complaints of any parts elſe.

At her firſt admiſſion, ſhe took ſeveral doſes of purgatives, which operated ſufficiently, but brought little or no wind along with the fœces, and altered the ſtate of her belly very little. On account of her being irregular in her menſtrua, and a ſuſpicion of pituita in the *primae viae*, ſhe was next ordered ſome doſes of calomel, which produced very little change; and, during two months thereafter, ſhe was conſtantly taking large doſes of the antihyſteric medicines, either by themſelves, or mixed with purgatives: The antihyſteric plaiſter was kept always applied to her whole belly, and once or twice the ſemicupium was uſed, but without any appearance of the diſeaſe being cured, or certainty of the remiſſions ſhe now and then had being owing to any particular medicine; for, though the ſwelling did not increaſe for two or three, nay, nine days following more than once, yet the hardneſs and tumors of her belly did not entirely remove, her coſtiveneſs always remained, ſhe had no paſſage of wind any way, and the medicine that at one time ſeemed to relieve her, was of no effect in the

next

next return. From the time of her admiſſion, ſhe had her menſes only twice, viz. May 17th, and June 21ſt.

During this period, there are ſome facts remarked in the Journal which ſeem worth obſerving. 1. Several times upon the ſwelling's falling, ſhe complained of a head-ach, once upon the detumefaction complained of pains thro' all her body, once of a giddineſs, twice had a nauſea and vomiting, and in the laſt threw up green bile; and once her ſtomach ſwelled greatly, when the reſt of the abdomen ſubſided. 2. During the flowing of the menſes, ſhe did not ſwell, but became very big upon their ſtopping. 3. Blooding and emetics, which were made uſe of for ſome accidental urgent ſymptoms, had no very ſenſible effects in making the principal diſeaſe either better or worſe. 4. She never had paſſage of wind any way, except a little belching ſome days before the firſt monthly evacuation.

Some time before the laſt eruption of the menſes, the purgatives were given more ſparingly, and the doſes of the antihyſterics of the ſtrongeſt kind, ſuch as *aſſafœtid. ol. C. C. &c.* mixed with ſoap, were enlarged and given more frequently, and accompanied with the hotter antiſcorbutics, as they are commonly called, *e. g. rad. raphan. ruſtic. recent. zinziber, &c.* infuſed in ſtrong ale with ſteel. The patient was ordered to uſe frequent and ſtrong frictions to all the trunk of her body and extremities, and to exerciſe moderately. Immediately before the menſtrua began to flow, clyſters of the ſame kind of medicines were in-

jected. The courſes were in ſufficient quantity: But, as ſoon as they ceaſed, her belly increaſed in its circumference four inches and a half, but ſoon ſubſided: And then ſhe complained of pains, which a gentle ſweat carried off. Borborygmi were for the firſt time obſerved, on the ſame day, June 25th, and, having taken ſome *tinctura ſacra* at night, ſhe paſſed ſome blood next day by ſtool. This again was the firſt appearance made by the haemorrhoids, which ſhe had been formerly ſubject to.

The two following days her ſaponaceous antihyſteric and antiſcorbutic medicines being ſtill continued, ſhe had ſuch exploſions of wind ανω και κατω, that none of the other patients would remain in the ſame room, nay ſcarce on the ſame floor with her. Her belly became leſs, and ſofter than it had been from the firſt attack of the diſeaſe; her medicines, (with a doſe of *ſyrup. de rhamno* at proper intervals) ſtill were continued, (only the proportion of ſteel was increaſed), her flatulent diſcharge went ſucceſsfully on; and, though for ſome time the ſwellings returned, ſhe was ſtrong enough to do the work of another ſervant of the Infirmary, who had fallen ſick; and, having continued a conſiderable time in that ſtation of ſervant to the hoſpital, ſhe ſtill uſed her medicines, till there had been no relapſe for ſeveral months; ſince which ſhe has been in very good health, notwithſtanding her having gone from the Infirmary into ſervice, where ſhe wrought hard, fed indifferently, and commonly walked bare-footed.

XXXII. Co-

XXXII. Colics *for six Years, from a Concretion formed on a Plumb-stone lodged in the Guts; by Dr* THOMAS SIMPSON, *Professor of Medicine in the University of* St Andrew's.

A Girl about twelve years of age, who had been long troubled with colic pains, was last year under my management. She complained of pains fixed in one part about two inches below the short ribs of the left side, somewhat nearer to the back-bone than to the navel, where I was informed they had kept for at least three years; but for three years further back (in which they were confident she was subject to colics) they had not observed whether the pains were fixed to one particular part or not. As to the occasion of these pains, the child's relations told me, that sometimes she took them, when they could blame nothing, but that she never missed them some hours after eating pease, oranges, strawberries, or any other summer fruits, and upon taking any thing that was sour, or hard of digestion; all of which for the most part produced a loose belly, which carried the trouble off; but, if this did not happen, they were obliged to procure some stools by purges or clysters, which always succeeded till this attack of the disease, when I was consulted.

This fit, which was reckoned to have been occasioned by drinking small ale upon the turn, was accompanied with a violent constipation; and the pain was so violent, that she cried out in a most moving way, holding the

affected ſide as firm as ſhe could with her hand. Her ſtomach was ſo ſqueemiſh, that ſhe threw up every thing immediately after ſwallowing it. Her pulſe was in the mean time of a natural ſtrength and quickneſs, clyſters had little effect on her; and though ſhe got purgatives in different forms, and clyſters were repeated ſome hours after, to ſolicit them downwards, yet they never were ſucceſsful. Several other remedies were uſed at the ſame time, but all to no purpoſe. The pain and vomiting ſeldom left her for three weeks together; in which time, from the fatigue and want of ſleep and nouriſhment, ſhe was brought from a plump well-coloured girl, to have much the countenance of a ſkeleton.

After ſo many diſappointments in my attemps to help her, and looking on her caſe as deſperate, I was reſolved to give her no more drugs; but, early in a morning, obſerving her to vomit a great deal of bile of a deep tincture, I began to ſuſpect, that the abounding of ſuch a ſharp liquor might be the occaſion of her trouble, and with that view deſired ſhe might drink down an Engliſh pint, or a pint and an half of tepid water, to provoke her to vomit, and to repeat this ſix or ſeven times. She immediately fell about the work; and, with ſome ſmall intervals, went through her taſk, which proved a remedy to her, but in a different manner from what I expected; for, after ſhe had vomited five or ſix times with the water, ſhe had a demand to ſtool, which was copious; and in paſſing the fœces, ſhe was ſenſible of ſomething bulky and hard among them.

Upon

Upon a ſearch, the ball herewith ſent was found. (See tab. IV. fig. 3. and 4.)

This ball is, you ſee, of an irregular cubical ſhape, with a deep depreſſion A (fig. 3.) in two of its ſides that are oppoſite to each other; it was four inches in circumference, and weighed five drachms at firſt, though now it is much lighter: It ſeems to be compounded of threads matted together, and diſpoſed into layers, (See *fig. 4. which repreſents the two parts of it when it was cut through the middle.*) In the middle of it, there is a plumb-ſtone B, the flat ſides of which anſwer to the depreſſions in its external ſurface. C ſhews the cavity in which the convexity B of the plumb-ſtone was lodged.

I imagine the plumb-ſtone had been ſix years in my patient's body gathering the cruſt round it, and had occaſioned the colics ſo long: In the perſuaſion of her diſeaſe depending on this preternatural ball, I made no ſcruple, when aſked by the friends whether I thought ſhe would be any more troubled with theſe colics, to give it as my opinion, that perhaps ſhe might have ſome ſmall relapſes, till once the parts ſo long diſtended and compreſſed by the ball had recovered their natural ſtate again, but that in a ſhort time ſhe would be quite free of them, ſince what I was confident was the cauſe was now removed; which has fallen out accordingly, ſhe having had no fits theſe eight months except two; one ſhe took pretty ſeverely the tenth day after paſſing the ball, which was carried off by bathing and bleeding, a ſecond ſhe was ſeized with half a year after from cold, which went off without medicines: And all this

while she has ate every thing that comes in her way, particularly peaſe and oranges, which of all things brought formerly the fit moſt certainly upon her.

Additamentum Ann. 1746.

THE end of laſt year, I opened a brewer, who, for many years paſt had very little reſpite from ſevere colic pains, ariſing from the right ſide, above the haunch-bone; under them he would have been ſome weeks toſſed together, ſometimes with a perpetual vomiting and great feveriſhneſs, and though the open belly often relieved him, yet he had often a looſeneſs with the pain, by which diſorders he was much decayed in his ſtrength, though originally a very ſtrong man, and at length, under the ſeverity of a long continuing fit, expired.

Upon opening him, I found the hard tumor, which I eaſily felt externally, and always had judged in the meſentery, to be in the caecum, which I ſlit quite croſs, and yet had difficulty to extract from it two large tumors, one about the bigneſs of a gooſe and the other of an hen's egg, of the ſame ſubſtance with that in the preceding hiſtory, but more knobby; they lay in particular cells of that inteſtine, which with the parts about was very much inflamed: The leſſer, when cut through, had nothing heterogeneous in it; the greater had a bit of the broad extremity of a ſheep's rib, near the largeneſs of the nail of my fore-finger, and ſomewhat triangular, not far from

from the moſt centrical part. Mr Spence ſurgeon in Dunkeld ſent me one ſome years ago with a ſmall cherry-ſtone in it, acquainting me that an old woman had paſſed five of them, about the bigneſs of walnuts, with one doſe of phyſic. Mr Robertſon ſurgeon in Crail, in the ſame way, brought ſeverals from a patient, about the bigneſs of nutmegs, but none of them had any yolks, and were all of the ſame ſubſtance with what I have deſcribed, having ſeen ſeverals of them cut up. I have forgot if theſe gentlemen had obſerved any ſymptoms in their patients which they had referred to theſe concretions: But the honour and credit of our profeſſion requires that ſuch cauſes lie before us, when judging of colics frequently returning and ariſing from the ſame place.

XXIII. *An ESSAY on the Jaundice, by*——

WHERE theories are only applied to the reſolution of ſome ſpeculative queſtion, it is of uſe to expoſe the falſe colouring; but where they are employed to explain the nature of diſeaſes, and either immediately, or by very ſpecious conſequences, are introduced to influence the therapeutic part of phyſic, they ought to be thoroughly examined, that we may either have a valuable truth confirmed, or the world may be put out of the hazard of being ſeduced by a dangerous error: It is with a view of being ſerviceable this way that I propoſe to examine the cauſes of a very common diſeaſe, the JAUNDICE, which is treated of by the

the generality of ſyſtematic authors in phyſic, in a manner that is capable, in my opinion, of being attended with bad conſequences.

One of the moſt frequent cauſes of a jaundice is ſaid, by ſome authors of the greateſt reputation, to be an obſtruction of the extreme capillary veſſels of the liver, and this obſtruction may, according to them, depend on inflammation, ſchirrus, pituita, &c. I ſuſpect, on the contrary, that no obſtructions in the extreme branches of the hepatic blood-veſſels is capable of producing this diſeaſe, unleſs in ſome particular caſes where they may act as a remote cauſe; of which I ſhall have occaſion to make mention afterwards.

I would found this negative proof on the nature of all the ſecreted liquors, which never appear in the compound maſs of our fluids, but only begin to diſplay their different properties after they are ſeparated from the other juices by the ſecerning organs; and even then, they do not ſeem to partake of the qualities generally aſcribed to them, and by which they are known, until they are farther prepared, and are thrown into ſome large canals where their quantity gives us an opportunity of examining them: If, after they are thus ſecerned and prepared, they are again mixed with the other liquors, without undergoing ſome new change in their compoſition, they do indeed evidently ſhew themſelves by their effects. Since then the particles, fit for the compoſition of any of our liquors, cannot be ſaid to enjoy the properties of ſuch liquors, I cannot ſee why thoſe that enter into the com-

compoſition of bile ſhould be ſuppoſed to produce the effect of bile, without having been ever ſeparated. We ſee plainly on the ſtoppage of the ſecretions of other liquors, whoſe colour, ſmell, and taſte, are capable of making us diſtinguiſh them, that they do not ſeem to ſhew themſelves in their natural form any where elſe; thus, for inſtance, in an hydropic perſon, whoſe urine is ſuppreſſed by the compreſſion or obſtruction of the veſſels of the kidneys, and whoſe belly and *tunica celluloſa* are thence greatly diſtended, we do not find that the waters, extravaſated into theſe cavities, have the real marks of urine in them; nay, in the diſcharges of the ſkin and kidneys which are ſo ſuccedaneous to each other, we cannot obſerve urine drilling through the ſkin, nor any thing like ſweat in the liquor diſcharged from the bladder. From theſe and other ſuch examples, I would imagine an obſtruction of the blood-veſſels of the liver, conſidered only as ſuch, to be incapable of mixing bilious particles with the other fluids that are to circulate through the whole ſyſtem of veſſels; and therefore incapable of producing a jaundice.

But, ſeeing reaſoning *a poſteriori* is much more convincing in ſuch matters than any other, I would next obſerve, that, if particles fit for compoſing bile were ſuppoſed capable of producing all the effects of bile, it would then neceſſarily follow, that, whenever ſuch particles were ſent in large quantities from the *vena portarum* into the *vena cava*, a jaundice would be formed; conſequently this always would happen when any conſiderable obſtruction

tion is made in the liver. Daily practice, and heaps of obſervations handed down to us, ſhew however, that violent inflammations and great abſceſſes have been in the liver, and that whole bowel has been ſchirrous, without any appearance of a jaundice. The examples are ſo numerous, I need not quote authors: See only Bonetus's collections. The concluſion, therefore, that neceſſarily follows from theſe facts, is in the negative to the allowing obſtructions to be an immediate cauſe of the jaundice.

It may be alledged, that hitherto I have too abſtractedly conſidered obſtructions as a ſtop put to the paſſage of the liquors through the extreme veſſels, whereas I ought to have had regard to the neceſſary conſequences of ſuch an obſtruction, which it may be thought would ſolve all the phaenomena upon my own principles. Theſe conſequences are the diſtenſion of the obſtructed canals, and the compreſſion they muſt make upon the adjacent parts, among which there muſt be ſeveral that contain the bile that has been ſecerned, which will therefore be forced back again into the blood-veſſels to occaſion a jaundice.

That I may give my opinion diſtinctly on this ſubject, it will be neceſſary to conſider the different parts of the liver where ſuch an obſtruction may be ſeated.

If the obſtruction is made in the concave ſide of the liver, in parts ſituated near to the large biliary ducts, and if the ſwelling is very great, I ſhall allow it may ſtop the paſſage of the bile into the gut; and ſo may ſerve as a remote cauſe of the jaundice. I am not however

ever convinced, that this effect will follow from the compreſſion of the hepatic ducts, unleſs the cyſtic bile is alſo prevented to flow into the duodenum: My grounds of doubting whether the hepatic bile can occaſion this diſeaſe, are the following: Both by the taſte of the liver at ſome diſtance from the gall-bladder, and by trials made of the hepatic bile when collected, we plainly find it to be a very mild liquor, with a very ſmall proportion of the proper bilious particles. Next we ſee moſt of the drains of the body capable of tranſmitting bilious particles along with their other fluids; Thus the ſpittle of icteric people is bitter, and their urine, and ſometimes their ſweat, tinges linen yellow. Laſtly, the quantity of bile conſtantly refunded to the maſs of blood along with the finer parts of our food is conſiderable, and probably ſome of it has not its compoſition changed by the force of digeſtion: yet there is no appearance of its mixture in a natural ſtate. From theſe obſervations, one would be apt to ſuſpect the bilious lymph of the liver to be capable of gradually mixing with the blood, without manifeſting itſelf, eſpecially ſince it can ſo quickly be ſent out of the body by the excretories; nay, tho' this ſhould not happen, we can ſcarce ſuppoſe ſuch a high colour, ſtrong taſte, and violent effects, ſo quickly produced by the hepatic bile, as is daily ſeen on the firſt diſcovery of the jaundice. To theſe arguments might be added the deficiency of proper obſervations or experiments to prove the jaundice produced without the cyſtic bile.

When

When obſtructions of any kind occaſion a tumor, any conſiderable way within the liver near the branches of the *porus biliarius*, it may in part ſtop the courſe of the bile in theſe branches, from which it may be taken up by the ramifications of the *vena cava*: But the conſequences of ſuch bile will be of ſo much leſs effect towards creating a jaundice than in the foregoing ſuppoſition, as the quantity of bile hindered to flow to the common duct is leſs; and, in confirmation of this not being an adequate cauſe to produce this diſeaſe, we have numerous examples of tumors of all ſorts obſerved in the liver upon diſſection of bodies that had no icteric ſign.

In reſpect of both the ſuppoſitions I have made, it is to be remarked, that a conſiderable tumor muſt be formed, before the ſides of the biliary canals incloſed in their ligamentous ſheath can be compreſſed ſufficiently to have the effects which I have granted, and when the tumor is large enough, it muſt firſt ſtraiten the branches of the *vena portarum*, which are larger than the contiguous biliary ducts; therefore, before theſe ſuffer, the quantity of bile ſecerned muſt be much diminiſhed; if the leſſening of this liquor is in the ſame proportion with the ſtraitning of the veſſels, the bile will paſs; if the ducts cannot tranſmit all of it, the quantity interrupted will be but ſmall, and its effects will be little.

The laſt ſuppoſition neceſſary to make, is the obſtruction of the veſſels remote from the larger biliary ducts, where the tubuli being ſmall, a leſs diſtenſion of the obſtructed canals will

will have greater effect on them. From what has been already said, it will seem at least necessary to suppose the obstruction pretty universal through the liver, in order to obtain such a consequence as is commonly disputed for. But then it is also obvious, that the obstructed vessels are the very canals that ought to supply the liquor which is to be secerned; and therefore the secretion will be prevented, which is also brought about by the compression which the tumefied vessels make on the small tubes from which the biliary canals rise, that is, on the secerning organs themselves. If then there is any truth in what I argued for, of unsecerned particles, which might prove proper enough materials for composing bile, not being capable of causing a jaundice, tho' they continue mixed with our mass of blood, it will follow, that neither on this third supposition will a jaundice be produced. Nor will it be amiss to support this reasoning, by repeating the mention of the many examples recorded of the liver being entirely schirrous or suppurated, without the person's ever having a jaundice.

This view of obstructions in different parts of the liver, give, I imagine, some reason to think such a cause unfit to produce a jaundice, whatever other bad effects such obstructions may have in disturbing the animal œconomy.

Whatever fate attends the doctrine of obstructions of the liver, must affect the practice of curing the jaundice; and, if this disease is so far from having obstructions for a frequent

cauſe that they cannot occaſion it, then *deobſtruent*, *aperient*, *reſolvent*, *&c.* medicines, and their different claſſes, adapted to the particular nature of the obſtructing matter, will appear to be rather contrived for removing or mitigating ſome concomitant ſymptoms, and palliating ſome effects of the jaundice, than deſigned to make a radical cure of the diſtemper.

By what has been above hinted, it will be readily conceived, that the only cauſe I would argue for as capable to produce a jaundice, is the ſtopping of the bile in the *ductus communis cholidochus*, or in the cyſtic duct, and perhaps in the hepatic ducts of ſome few perſons, whoſe hepatic bile is much ſtronger than it commonly is found.

Such an obſtruction may depend on a great variety of cauſes, ſuch as large tumors, or abſceſſes in the concave part of the liver, or in any other parts in the neighbourhood of the large ducts; violent inflammations, or other tumors in the coats of theſe ducts; the growing together of their ſides; violent ſpaſms in the duodenum, by poiſons, or in hyſteric diſorders; very great inflammations and diſtenſions of that gut, which often have the appearance of colics; and principally ſtones or concretions falling down from the gall-bladder.

Practical anatomiſts ſufficiently ſhew, how frequently concretions are to be found here; ſcarce any of thoſe who have handed down what they obſerved in diſſecting human bodies, have omitted to give hiſtories of this kind; only remark what a great variety are deſcribed

bed by Morgagni *: And, in another book, *Bonetus's Sepulchret. Anat.* we read a collection of numerous examples of this diſeaſe, the jaundice, proceeding from this cauſe, ſtones; and ſeveral of the greateſt practiſers in phyſic have taken notice of ſtones paſſing commonly, when the jaundice were going off. On theſe accounts it is ſurpriſing, ſo little regard is had now-a-days to theſe concretions, in the ætiology and cure of this diſeaſe, as to find them mentioned only *en paſſant* as a poſſible cauſe, without any directions to endeavour their expulſion in completing the cure, which I can only attribute to their being paſſed unobſerved, becauſe of the troubleſome diſagreeable office of ſearching for them.

Let us with all this conſider, how exactly the falling down of a ſtone from the gall-bladder into the duct, explains all the phaenomena that commonly happen in the jaundice, which no other cauſe will do, and we ſhall have reaſon to look on concretions as a much more frequent cauſe of this diſeaſe than is generally thought. If a ſmall ſtone falls into the duct, a conſiderable ſhare of the bile may ſtill paſs; and, though the patient's urine becomes higher coloured, the ſkin remains untinged; the gall-bladder gradually is filled with bile, which gives a ſenſe of weight in the right hypochonder; the ſecretion is diminiſhed in the liver by the greater reſiſtance now made to the evacuation of the bile; and the quantity of blood returned to the *vena cava* is greater,

* Epiſtol. adverſar. Anat. phyſico-medic.

which makes a fulneſs in all the veſſels of the body, giving the ſenſe of fulneſs and laſſitude, with an inclination to ſleep. When a large enough quantity of bile regurgitates, the jaundice appears; and, according to the change of ſituation of the ſtone, the diſeaſe will have remiſſions or increaſe. If the concretion is ſo large as to preſs on the ſides of the duct, it occaſions pains about the lower part of the ſtomach. If the irritation it makes is great, the pains become more acute and lancinating, and, the ſtomach ſympathizing as in the *calculus renum*, the patient vomits. If this irritation continues, the part where the ſtone ſticks will be inflamed, and the neighbouring parts ſoon alſo come to be affected. By the inflammation and pain, a fever may be raiſed. When the ſtone obſtructs the duct entirely, the excrements cannot be tinged yellow; nor will the inteſtines do their duty, becauſe of the defect of bile, which, being reaſſumed into the maſs of blood, tinges the urine, ſkin, eyes, &c. When the ſtone falls quickly into the duct and totally obſtructs it, the perſon becomes ſuddenly icteric. If the ſtone is ſoon puſhed forwards into the inteſtine, the diſeaſe is as ſoon removed by the paſſage of the bile being again free. If more ſtones ſucceed each other ſoon, the diſeaſe will appear to have had remiſſions. If there is any conſiderable interval between their falling down, ſo many periodical returns will be made of the diſeaſe. A diarrhœa often cures this diſeaſe, or rather a diarrhœa is the conſequence of the cure; for, as ſoon as the concretion falls into the gut, the bile that was

dammed

dammed up, follows in a great ſtream, and occaſions the diarrhœa, at which time the ſtone or ſtones will be found among the fœces.

Concretions not only exactly thus account for the appearances of the jaundice, but by them only the effects of ſeveral plain antecedent cauſes can be underſtood. This diſeaſe, for example, has been brought on by violent anger, riding, reaching to vomit, fits of an ague, and ſeveral other convulſions or agitations of the body, which we cannot imagine to be any other reaſonable way produced, than by a ſtone's being puſhed down by theſe ſhocks of the body into the duct, from the gall-bladder, where it lay floating before. Which leads me naturally to think phyſicians frequently liable to be deceived, when they ſuppoſe ſpaſms, inflammations, colics, acrid ingeſta, &c. bringing on a jaundice, by the ſole conſtriction of the biliary duct, without the help of any concretion; for in theſe caſes either the cauſes could not be ſo permanent, *e. g.* the ſpaſms would not continue ſo long as the diſeaſe does; or theſe cauſes ſeem not capable to bring on the diſeaſe ſo ſoon after their own appearance, ſuch is the inflammation; and, if the diſeaſe was owing to ſeveral of the cauſes mentioned, it would not go off ſo ſoon as frequently it does. It is much eaſier therefore to conceive, how ſuch forcible cauſes bring down a concretion, which proves the immediate cauſe of the diſeaſe.

If then ſtones are found moſt frequently to give riſe to this diſeaſe, without the acceſſion of any of theſe other cauſes, which I have ac-

counted capable of producing a jaundice; and, if these other causes are so well fitted for bringing down loose concretions, so often to be met with in the gall-bladder, it will follow that the first thing a physician ought to consider, when called to an icteric patient, is, whether any other cause manifestly shews itself without any indications of a stone, and, according to the particular nature of that morbid cause, he must prescribe; but, if either the symptoms of a stone's being engaged in the biliary passages are blended with the others, or, if there is not evident reason for not suspecting stones to have any share in occasioning the disease, which seldom will happen, particular regard is to be had to such concretions in the indications of cure.

I know it has been objected to the notion of bilious concretions so often producing a jaundice, that, in icteric bodies, no stones have been found in the ducts, tho' sought after; and, in other bodies, stones have been seen fixed in the ducts, without any preceding jaundice. To the former objection, it may be answered, that I have already allowed other causes to be capable of giving rise to this disease; and many cases can be supposed, where, tho' stones occasion it, yet we cannot expect they should be found. To name one instance among many, if an exhausted patient should die by the diarrhœa, which so frequently comes on when the concretions drop into the gut, it would be in vain to expect to find them. The other objection will as little prove what is intended by it, unless several other particular circumstances

ſtances are accurately obſerved; as, for inſtance, if the ſtone was lodged in the duct long enough to occaſion the diſeaſe, or if it has been only forced down by the agonies of death: If it is large enough, and ſo ſituated as to hinder the courſe of the bile, or if it ſtill might allow this liquor to paſs: If the liver is ſound, and fit to ſecern good bile, or if it is otherwiſe diſeaſed, and has either performed little or no ſecretion, or has ſeparated a liquor different from bile. For, if theſe circumſtances come out in the latter of the alternate ways I have propoſed them, this obſervation will have no weight as an objection.

But to return to the method of cure, I have already given reaſons why I think phyſicians are to act, in far the greater number of icteric caſes, with a view to ſtones that are to be expelled; and this will ſtill appear more neceſſary upon reconſidering the other cauſes, ſeveral of which do not admit of a cure, or at moſt we can promiſe very little upon our ſucceſs in treating them; ſuch are all large tumors, ſituated near the great biliary ducts, poiſons, *&c.* If theſe therefore are cut off, and if moſt of the other cauſes do not diſtinguiſh themſelves ſufficiently from concretions, it will not be thought improper to affirm, that jaundice ought to be treated, rather more than can be ſaid of any other diſeaſe, with one general indication of expelling ſtones; and the ſpaſms, inflammations, tumors, *&c.* are only to be looked on as ſo many concomitant ſymptoms, to which regard is indeed to be had in the management of the patient, while the main indication is to

be

be purſued; and medicines are to be applied in very near the ſame form and intention as are uſed in caſes of ſtones lodged in the ureters, which bear a very ſtrong analogy to the ſubject which I have juſt now treated of.

The general doctrine of jaundice depending on concretions, was communicated to the gentleman who wrote the preceding eſſay, by Dr Simſon *Profeſſor of Medicine in* St. Andrew's, *who, not chuſing to adopt all his friend's reaſoning, has tranſmitted to us the following eſſay on the ſame ſubject, which we hope will be likewiſe well received by the public.*

XXXIV. *An ESSAY on the* Jaundice; *by Dr* THOMAS SIMSON, Chandois *Profeſſor of Medicine in the Univerſity of* St. Andrew's.

TO give a right notion of the jaundice, I reckon it neceſſary to diſtinguiſh between a bilious colour appearing in the blood and tincturing the ſkin, which is not the product of the liver, nor of true bile regorging from the liver back into the blood, and giving its colour to the ſkin. Without this diſtinction, our hiſtory of the jaundice muſt be indiſtinct, as appears from many particulars.

I had occaſion, in a treatiſe I have drawn up of the uterine diſeaſes, to take notice of a phænomenon ordinarily appearing in infants, ſome of the firſt eight days after their birth, which our common people call the gum, and is often taken for a jaundice, from the deep yellow

yellow with which the ſkin is coloured, but in which I never ſaw the eyes tinctured, and ſeems to ariſe from a ſtrong tincture of the meconium drawn up into the blood, ſubtile enough to penetrate into the capillaries of the ſkin, but not into thoſe of the coats of the eye, as the finer bile does, and diſappears with the meconium.

It has likewiſe been found, that the bite of venomous animals has at once diffuſed a yellowneſs over the whole ſurface of the body: And Dr Tyſon has, in the Philoſophical Tranſactions, narrated an experiment made by an Indian in his preſence, wherein blood turned immediately yellow mixed with a little of the humour expreſſed from the bags adjoined to the fangs of the *cobra de capelo*. And in the Weſt-Indies, one of the malignant fevers is attended with an apparent jaundice, as happens ſometimes in fevers here and other parts of Europe. A perſon dying in one of theſe was opened in Flanders by my friend Dr Pringle, who examined the liver particularly; but no ſtoppage to the bile was found about it; the *membrana adipoſa* was found full of a yellow thin liquor, a quart of which was in the abdomen, and ſome ſmall quantity in the thorax; and the gall-bladder contained a black inſpiſſated glutinous liquor, which he reckoned Hippocrates would have called *black bile*. In vomiting under the diſeaſe, the perſon had caſt up a very green kind of ſtuff. From all which the Doctor reckoned the appearance aroſe from a luxuriant bile produced under the diſeaſe, which was moſt malignant, though not one in

twenty

twenty or thirty under it had the yellow colour: And, by Dr Tyſon's obſervation, we ſee how ſoon the whole blood may be turned into a kind of bile. Dr Bennet, in his third diſſertation *de Phthiſi*, ſhews how eaſily different colours ariſe in blood, as it is affected by different degrees of heat, *&c.* and amongſt them the bilious; and Dr Pringle, in making experiments upon the blood, obſerves, that lime-water mixed with the cake, and expoſed to a conſiderable degree of heat, produced a mixture like morbid bile, which, diluted with water, yielded the colour of green tea tinctured with a little ſaffron: So that the blood is apt, under different circumſtances, to aſſume the bilious colour. But, to confound theſe caſes, where the ſkin is coloured from a change purely in the blood, or ſome adventitious colour mixing with it from ſome other ſource than the bile, with that where the colour ariſes from an actual mixture of bile with the blood, is to confound caſes in our buſineſs which are eſſentially different; and therefore, in inquiring into the jaundice, it belongs to our profeſſion to carry our views ſomething farther than the ſkin and its colour.

The ſtructure of the liver and obſervations of what paſſes in the body, direct us to be attentive to what paſſes in the inteſtines, to know if the bilious colour of the ſkin ariſes from the ſtoppage of the courſe of the bile or not; for, ſince the native courſe of the bile is by the common duct of the liver opening into the inteſtines, then we may perſuade ourſelves,

ſelves, that, without ſome new cauſe to change this courſe, the bile muſt always be found at the inteſtines; and ſo in fact we find it, the dark yellow colour of what paſſes them being juſtly attributed to the bile, and the hard white excrement only taking place when the bile is deficient, which is moſt obſervable under the genuine jaundice, and indeed is the conſtituent ſymptom: So that if, at one and the ſame time, the ſkin and eyes are yellow, and the excrement white, one may be altogether certain of the paſſage of the bile being ſtopt into the inteſtines, and that it is thereby forced to regorge back into the blood: And, in this caſe, as the ſkin is coloured, ſo the urine is much impregnated with the bile which falls to the bottom in a very copious dark ſediment; and, by comparing theſe ſymptoms with thoſe attending the blood changed in itſelf, we ſhall find them moſt different, as muſt therefore be the cures; for, where blood is changed itſelf, the cure is only to be expected from curing theſe diſeaſes by which it was changed, the fever, poiſon, *&c.* But the obſtructed liver requires very different management, and the jaundice, which is its genuine offspring; and this is the only caſe I deſign here to treat of under the denomination of the jaundice.

As anatomy teaches us, that the common duct of the liver is the only place at which the whole of the bile can be intercepted, ſo diſſections diſcover, that the largeſt tumors in the liver do not intercept the bile from it, or prevent its courſe to the inteſtines. I myſelf have obſerved the liver increaſed at leaſt a third

third in its bulk, with a great collection of hydatical tumors in its moſt centrical parts, in a patient which never had the leaſt appearance of the jaundice, tho' labouring for many years under great pain and ſickneſs from this bad ſtate of the liver; and inſtances every where occur of tumors of all kinds in that bowel without any prejudice that way, as may be ſeen in looking over Bonetus's collection. Nay, the *pori biliarii* often petrify in oxen without ſtopping the courſe of the bile, they ſtill keeping tubular. And in general, under the largeſt ſwellings, if not bounded by rigid walls, as happens in the brain, the circulation ſtill keeps up; nay, the veſſels generally enlarge with them; ſo that the ſituation of tumors muſt be narrowly examined before we can determine that they affect particular veſſels or ſecretions. I have ſeen myſelf a tumor as large as a walnut, quite round the common duct of the liver, and yet the paſſage rather more patent than ordinary; nor had the perſon ever any appearance of a jaundice that I could find. I don't refuſe that the liver has often been found very diſeaſed, accompanied with a jaundice; but I am more apt to look upon this as its effect than the cauſe, ſince I find in other caſes the greateſt diſorders of that kind without any ſuch thing; and the ſtopping the courſe of the bile muſt neceſſarily expoſe the liver to the greateſt hazard of inflammation, ſuppuration, *&c.* as likewiſe the whole of the viſcera, whoſe veins ſupply it, the common duct of the liver being a common excretory duct to them all; and therefore, from impeding the diſcharge

charge of the bile by it, all the different viscera contributing to the *vena portarum*, must have the course of the blood in them retarded: Hence that oppression, weight, and laziness accompanying the true jaundice. Anatomy then must teach the judicious physician to examine what disorders in a person dying of the jaundice are to be looked on as the effects, and what as the cause, and not rashly advance every bad appearance promiscuously as causes. We have shown to what length the liver can be diseased without any regorging of the bile, and consequently without a jaundice; and some small reflexion would persuade us, that, if large tumors in the body of the liver, or inflammations, were to stop the course of the fluids through it, that they would rather hinder the secretion of the bile than make it regorge; for, after the secretion, it has already passed the greatest straits of the vessels, which are now still widening more and more. But such arguments *a priori* I trust little in theory, which ought chiefly to be built upon observations, which seem of no less weight to persuade us, that, in the gall-bladder of a number of people, there lurks a cause most effectual to produce the jaundice, when by any means it changes its seat to the common duct, than they are to satisfy us, that the largest tumors can exist in most parts of the liver without any such effect: The cause I mean is stones in the gall-bladder, which the moderns have found to be as common as stones in the kidneys, and consequently should be as much in our view in judging of the disorders of the liver and its

ſecretion, as the nephritic ſtones are in judging of ſuch diſorders in the kidney; and, if this had been done, we ſhould not have been left to ſuch doubtful management in that diſeaſe, which has been much in the hands of quacks, while, in the mean time, no diſeaſe affords more plain indications of cure. Fernelius is among the firſt, who, about two hundred years ago, took notice of theſe ſtones, as we find in Mathiolus's letters, who had been conſulted by Camenicenus concerning them; and, ſince that time, there is nothing more commonly found in diſeaſed bodies than numbers of ſuch ſtones, from twenty to upwards of an hundred; but, in the gall-bladder, they lie as ſmall ſtones in artificial gutters, and, being very ſmooth and ſoft, give no diſturbance from irritation: But then, ſneezing, coughing, vomiting, wreſtling, jumping, convulſions, a ſudden ſtep, and every other thing, making a preſſure on the liver, threatens to bring them down to the common duct, where, if they ſtop, a jaundice muſt enſue, of more or leſs continuance, according to their ſtay, and of a leſs or greater depth in colour, as the blood is more or leſs impregnated: Which conſiderations will eaſily account for all the phænomena in this diſeaſe, and the variety with which they appear, and the difference there happens in the cure, ſome diſappearing immediately, and ſome after many days, while others are infallibly fatal; but theſe more rarely happen, ſince no ſtone can enter the common duct but what has a chance of paſſing; and when they enter, the action of the muſcles of the abdomen and

reſpiration

reſpiration urging them forward, muſt convince us, that the diſeaſe will often cure without any remedy, or under management with remedies nothing to the purpoſe, as do all diſeaſes which depend on cauſes which yield of themſelves, of which there are a great many: And thus the ignorant quack may be ſucceſsful. By this view of things, we find how, from this hoard of ſtones being ſo often found in the gall-bladder, we are enabled to account for the frequency of the jaundice, the cauſes which are alledged to procure it, its having ſo many idle medicines devoted to it, its progreſs and different turns. And that, in fact, they are the immediate cauſe, what Fernelius obſerved gives the greateſt aſſurance, who, in treating of the diſorders of the gall-bladder, tells us, he found a ſtone which filled it quite up; and then adds, *Quinetiam poſt diuturnum icterum, oborto alvi profluvio, hujus naturæ innumeros calculos, inſtar piſi, aut hordei, in pleriſque exturbari deprehendimus*; and Baglivi, who had frequently met with theſe ſtones, as we find in his treatiſe *de Bile*, gives us a progonoſtic from them, *Si videris icteros ſanatos, ſed recidivos, eos certe a calculo veſicæ felleæ progigni prædicito*: But, why we ſhould not judge of a ſingle attack of the jaundice to come from the ſtones likewiſe, I cannot find, ſince there is no other cauſe we have ſo much reaſon to ſuſpect: It is poſſible indeed that the common duct may be otherwiſe obſtructed, as I obſerved in a perſon who died of a jaundice, and had his meſentery, pancreas, and part of the duodenum and jejunum quite ſchirrous, by which the duct was

quite aboliſhed at its entry into the inteſtine; and others have given examples of its ſides being grown together: But who would make allowances for theſe in forming indications of cure, ſince theſe caſes are ſo very rare, and, when they happen, incurable? And thus it is, that, by a regular ſurvey of the ſtate of this diſeaſe and the circumſtances of the liver, as inſpection has detected them, we come to judge what are the ordinary and more plauſible cauſes of this frequent diſeaſe; what have been erroneouſly ſuſpected as cauſes; and what are the extraordinary cauſes which are little to be regarded in our indications of cure. I ſhall only further obſerve, that I have known, and at preſent know, ſeverals who have had a moſt luxuriant ſecretion of bile; ſo that they ſeldom miſſed of an uneaſineſs in the ſtomach, and violent head-ach once a fortnight by it, under which they would often vomit a pound or two of pure bile like the yolks of eggs, as they generally did upon taking a vomit; and yet none of theſe perſons ever appeared with any thing of a jaundice, as we find in the hiſtory I gave of one of them in the fourth of my diſſertations, where I deſcribed its conſequences at large; ſo that I rather ſuſpect the maſs of blood to be changed, when the appearance of a general prevalency of the bilious colour is obſerved through the body, than a luxuriant ſecretion; if, at the ſame time, the ſigns of the common duct being obſtructed do not manifeſt themſelves.

And, thus we find, how anatomy duly attended to, not only leads to the beſt theory of diſeaſes,

diſeaſes, but corrects what had taken place from a leſs accurate anatomical ſurvey.

XXXV. *The Bladder become ſchirrous, from a ſingular Cauſe*; *by Dr* EDWARD BARRY, *Phyſician at* Cork *in* Ireland.

MR Moſes Dean, a gentleman of a conſiderable family and fortune, naturally of a ſtrong habit of body, and of a ſtrictly temperate manner of living, while a child had often diſcharged gravel and ſmall ſtones with his urine. The ſymptoms attending ſuch a diſorder increaſed as he grew older; and about the age of twenty-four he was cut on the gripe (as the leſſer operation is commonly called) for the ſtone, and a very large one was taken out of his bladder. Soon after the wound in the perinæum was healed, he complained of a pain in that part, this was ſucceeded by a hard tumor, which gradually increaſed in a painful manner, for the ſpace of twenty-one years, at which time it was ſo large, that it was equal to the ſize of a turky egg, and prevented him from riding or ſitting, but with great uneaſineſs. One day being in a chariot, he received a ſudden jolt, which gave him ſuch exquiſite pain, that he ſent for a ſurgeon, and told him that he was determined to have the tumor cut out, or opened immediately. The ſurgeon, though ignorant of the nature of the tumor, applied a cauſtic, and afterwards cutting on the eſchar, a very hard reſiſtance was perceived, which, by dilating the

part, he found to proceed from a large ſtone about four inches and a half in length, and two and a half in breadth, contained between the bladder and the perinaeum. The ſtone had a ſmall riſing proceſs which was fixed in the orifice of the bladder. After the ſtone was extracted, the urine conſtantly flowed out of that orifice, which always obliged him to keep a veſſel or ſponge to receive it, till the time of his death, which was ſeventeen years after this laſt operation.

During that time, ſeveral ſmall ſtones paſſed through that orifice, which, with the acrimony of the urine perpetually running off, not only hindered him from ſitting or riding, but made his whole life a conſtant ſcene of miſery.

A year before he died, purulent matter frequently ſubſided in his urine; all the ſymptoms continued to increaſe, attended with bloody urine, a pain in the region of the kidneys, colics, and frequent vomiting.

On diſſecting his body, at which ſeveral were preſent, his kidneys were found very large, with an unequal rough ſurface, owing to a great quantity of gravel collected in them. A large ſtone which could not paſs the ureter was lodged in the pelvis of the right kidney, which was greatly dilated. In the left kidney, a large ſtone was found in a bed of corruption.

When the pelvis was examined, I was at a loſs to find the bladder, nothing that bore the leaſt reſemblance to it appearing; and, in the place of it, a hard ſolid ſubſtance was diſcovered, which I concluded muſt have been the bladder,

der, by the insertion of the ureters into it, which discharged the urine into the fistula.

This indurated scirrhous bladder had no cavity but what the small stream of urine kept open; it weighed thirteen ounces and a quarter. Cutting through it, the inside was white; and it seemed to consist of several distinct schirrous glands.

From the insertion of the ureters to the external orifice, was one continued fistulous cavity. The external margin of the perinæum was mortified, the inside of the fistula was ulcerated, and had large lateral sinuses, and that part of the indurated bladder through which the urine passed was cancerated.

It plainly appears, that this uncommon disorder was owing to the external orifice in the perinæum being healed after the operation, before the internal orifice in the bladder was united; by which means the sandy sediment in the urine subsiding and pushing through it, formed a stone between that and the perinæum, which, for the space of twenty-one years, increased and dilated the adjacent parts, till they could not admit any further distention, and then the small rising process filled the orifice.

I never visited this gentleman till about two years before he died, and, by a cooling, opening, anodyne regimen, endeavoured to palliate the symptoms. This was all the relief his case would then admit of; but, when the last stone was taken out, there were two different methods by which this preternatural alteration in the bladder might, I believe, have been prevented.

The

The first was by uniting the orifice in the neck of the bladder, by first reducing it to a green wound; but, as the lips of it must have been very callous, this might have been attended with great difficulty and danger.

The next was, by injecting through the orifice into the bladder morning and evening about a pound of any detergent injection, which by that means might have kept it pliable and free from obstructions, and given artificial motion, which might have supplied the defect of the natural one, and perhaps in some cases, where the habit of the body is disposed to form calculous concretions, it might be preferable to the former; for it is certain that a great number of stones did often pass through this orifice, which were too large to be discharged by the urethra, and which might otherwise have been more quickly fatal to him than this disorder, in which he miserably languished so many years.

XXXVI. *A Retention of the Seed in Coition, by* WILLIAM COCKBURN, *M. D. and Fellow of the Royal Society.*

A Noble Venetian, aged twenty-two years, was married to a very fine lady, with whom he cohabited with a good deal of vigour, but never could emit seed in the coition; whereas in his dreams he could discharge very freely. This misfortune very much afflicted him and his family; and, as no remedy could be found at home, the Venetian Ambassadors

sadors residing in the different courts of Europe were desired to consult some of the most eminent physicians in the parts where they resided, to account for the causes, and to find out a cure for this extraordinary complaint of the difference of the states when in sleep, and when actually in coition.

I was of opinion it consisted altogether in the urethra, being closely shut up by vigour of the erection in coition, which formed so great a resistance, that the powers which throw the seed out of the *vesiculae seminales* could not overcome it; whereas in dreams, the pressure on the urethra being much less, an evacuation was made.

The method of cure was not less successful than obvious, from the foregoing account; for gentle evacuations, and a slender diet, brought about, and fully completed their desires.

XXXVII. *A Palsy of the inferior Extremities, with Mortification; by Dr* JOHN DRUMMOND *senior, late President of the Royal College of Physicians in* Edinburgh.

A Girl, ten years of age, having catched a great cold in the month of October 1705, complained next day of a pain and weakness of one of her legs, and the day following lost the use of both, when the pain ceased. Two weeks after, she was brought to Edinburgh, and put under the care of Dr Archibald Pitcairn, Dr Andrew Melvill, myself, and

Mr

Mr Alexander Monteith ſurgeon. We found ſhe had loſt all ſenſation and motion from the loins downwards, to ſuch a degree, that ſhe did not feel when pinched or pricked in theſe parts, and voided her excrements and urine involuntarily.

On the 9th of November, the following fomentation and ointment were ordered to be applied to her limbs.

℞ *Fol. roriſmarin. ſalv. abſinth. a mj. Flor. chamæmel. ſambuci a. pug.* ii. *Lign. guaj. jac. unc.* ii. *M. coq. ex aq. calc. lib.* viii. *ad lib.* vi. *addendo tempore uſus Sp. V. unc.* iv.

℞ *Ung. opodeld. unc.* i. *ſem. Ol. ror. marin. chemic. drach. ſem. Ol. abſinth. chem. drach.* ii.

November 12th, ſome little puſtules and bliſters began to appear upon one of her legs, for which an ointment of *ung. alb.* made firm with ceruſſe was ordered.

15th, She took this purgative, ℞ *Syrup. violar. unc. ſem. Tinctur. jallap. drach. ſem.* but got not one ſtool by it, tho' about midday ſhe had *Syrup. de rhamn. unc. ſem.* given her.

16th, Preſcribed a purgative in this form,

℞ *Syrup. de rhamn. violar. a. unc. ſem. Tinctur. jallap. ſcrup.* ii. But this did not in the leaſt operate. At five o'clock in the evening, this clyſter was injected. ℞ *Decoct. commun. pro clyſter. unc.* viii. *Electuar. lenitiv. unc. ſem. Vin. emet. drach.* v. But this ſhe alſo retained till about nine, when a ſharp ſuppoſitory was introduced.

The

The blisters on her legs began then to be so big, that the fomentation and ointment could not be used. These blisters being cut with a pair of scissars, the skin below appeared black, but separated easily afterwards, and healed with *ung. alb.*

19th, The purgative was renewed, with addition of *tinctur. jallap. scrup.* i. but did not operate till a suppository was given at night.

23d, Her thighs and legs were sweated plentifully in a box, in which spirit of wine was burnt. This sweating was continued for some days, and then both her legs appeared covered with blisters; at the bottom of each of which, when cut, a black spot was observed, which separated by the suppuration in the same manner as the escar of a caustic. The sordid ulcers remaining after these gangrenous crusts casting off, cured with the application of common digestive and *aq. calcis*, tho' frequently the bones were discovered by them; and, when they seemed to be near healed, a new gangrene discovered itself at some side of them.

December 4th, It was resolved to give her a few grains of calomel; and that evening she took *gr.* iv. in conserve of roses.

5th, The bolus was repeated, and in the night she purged a great deal of black fœtid excrement.

9th, Her pulse felt very weak and languid; the purging still continuing, this julep was prescribed: ℞ *Aq. meliss. ceras. nigr. a. unc.* ii. *cinam. f. v. drach.* vi. *Confect. alkerm. drach. sem. Laudan. liquid. gutt.* xxv. *Syrup. caryophyll.*

cariophyll. unc. i. *M. Sumat cochleare ad libitum.* At night ſhe took *Mercur. d. gr.* iii. *Diaſcord. q. ſ. ut fiat bol.*

10th, A black ſpot, as large as half a crown, appeared upon the *os ſacrum*; it was hard as if made by burning, and turned the edge of the biſtory with which it was ſcarified: When the ſcarifications were made on every ſide to the ſound fleſh, the mortification was found to reach as deep as the bone; it was dreſſed with tincture of myrrh and aloes, and common digeſtive to the ſides.

11th, Notwithſtanding the former dreſſing, the black mortification had ſpread half an inch on each ſide; after having ſcarified again all round the edges, it was dreſſed as formerly.

12th, The ſphacelated parts began to ſeparate from the ſound, but another gangrenous ſpot appeared on the left hip, where the *os femoris* is articulated with the *oſſa innominata*; this being ſcarified and dreſſed as the other, began to ſeparate in two or three days.

15th, Another ſpot of the ſame nature, as broad as a crown, was obſerved on the under part of the left hip, one inch and an half diſtant from the podex, and ſtretched towards the pudenda: Another little gangrene was remarked at the ſame time upon the right haunch-bone.

All of them were ſcarified and treated after the ſame manner. When the gangrened parts entirely ſeparated, the bone was always diſcovered in each of them, though theſe were the thickeſt muſcular parts of the body.

An

All this time the patient purged incredible quantities of black moſt violently fœtid fæces.

17th, She took this bolus, ℞ *Limatur. mart.* gr. v. *Aqil. alb. gr.* iii. *Conſerv. roſ. q. ſ. ut fiat bol.* which was repeated on the 18th and 19th at night.

The ulcer which was made by the falling off of the firſt gangrene, and by which the *os ſacrum* was diſcovered, began to appear clean, and the bone to be covered with fleſh, when on the 23d a new mortification appeared on the lower edge of the ulcer, which, when ſeparated, diſcovered a conſiderable ſhare of the *os ſacrum* and coccygis. At night, and on the 24th, the bolus laſt preſcribed was given her.

25th, A vomit of *turbeth mineral gr.* iv. was given; it vomited her gently.

30th and 31ſt at night, the bolus of *aquil. alb.* and *limatur. chalyb.* was renewed.

2d January 1706, the *turbeth mineral* vomit was repeated.

4th, The cartilage which covers that part of the *os iſchium* on which the tendon of the internal obturator muſcle moves as on a pulley, ſeparated and was brought away: So that, by the mortification on the lower part of the left hip, the *muſculi obturatores*, *pyriformis*, *quadratus*, and *gemelli* were deſtroyed, and by the other on the joint of the thigh, the glutæi were alſo ruined.

After this, the patient's pulſe was ſo weak, that we preſcribed nothing except a weak decoction of ſarſaparilla. Several new gangrenes appeared at the edges of the old ulcers, which ſeparating, enlarging theſe ulcers ſo conſiderably,

siderably, that a man's whole hand might have been thrust into some of them.

10th, The *os coccygis* came out.

4th February, The great trochanter separated from the thigh-bone and dropped out; and the ligaments about the joint of the thigh being putrified, the head of the thigh-bone thrust itself out at the ulcer, and at every dressing it required to be reduced. She began now to purge fœces of the ordinary colour and smell; but, her pulse still becoming weaker, and her strength decaying, she died on the 21st of February

During the whole course of her disease, she never complained of either pain or sickness, but diverted herself as other children use to do, and kept a good stomach, till about the middle of January, when she was considerably weakened.

From the beginning of December, till near the middle of February, she purged at least three or four pound of black very fœtid matter every day.

All the month of February, her legs, thighs, and belly were œdematous and remarkably big.

XXXVIII. *An Account of the most remarkable* Discoveries *and* Improvements *in Physic made or proposed since the Beginning of the Year* 1731.

MR William Houston surgeon has accurately described the plant of which the contrayerva is the root: The name he gives the plant

plant is *Dorſtenia, dentariæ radice, ſphondylii folio*, of which there are two kinds, one *placenta ovali*, the other *placenta quadrangulari et undulata*. *Philoſoph. Tranſact. Num.* 421. § 2.

Mr de Juſſieu, phyſician and member of the academy of ſciences at Paris, aſſures, from his experience of the ſucceſsful effects in dyſenteries of a thick yellow bark, which has an aſtringent gently bitter taſte, brought firſt into Europe from America in 1713, called there *ſimarouba*, and reſembling what is deſcribed by the ancients under the name of *macer*. Mr de Juſſieu obſerved, that this medicine was more ſucceſsfully given in decoction than in ſubſtance. The doſe he uſually gave was the third part of a chopin of decoction, which had two drachms of the bark in it. *Memoires de l'Acad. des Sciences*, 1729.

An accident of two women dying ſuddenly in Dublin, after drinking ſome of the common diſtilled laurel-water, gave riſe to ſeveral experiments made upon dogs with the diſtilled water, and with the infuſion of the leaves of this *lauro-ceraſus*, communicated by Dr Madden phyſician at Dublin to the royal ſociety in England, and afterwards repeated and confirmed by Dr Mortimer, R. S. S.; by which it appeared, that both the water and infuſion brought on convulſions, palſy, and death, when taken by the mouth or anus. *Philoſ. Tranſact. Num.* 418. § 7. and *Num.* 420. § 3.

We are informed from Leyden, that Dr Gau[illegible] who has ſucceeded Dr Boerhaave in teaching chymy, gave, in the beginning of 1731, a public college on milk; in which he ſhew-

ed a great variety of experiments, and, among the reſt, prepared its eſſential ſalt, by boiling whey *(ſerum lactis)* to one half, then filtrating it, he continued the boiling and filtrating till it became of the conſiſtence of a ſyrup, when it was put into a cellar to cryſtallize, and there the ſalt formed into a cake, which was of a ſaccharous taſte, and reſembled manna.

Not. This preparation is ſomewhat different from that which Valentini * alledges to be the famous *ſaccharum lactis*, ſo much cried up by the firſt preparer of it *Ludovicus Teſti* †, and recommended by others as an infallible cure of the gout.

The new experiments related by Dr Stahl, in his book of *chymical and phyſical Experiments*, are too numerous for us to enter upon an account of them, and moſt of them relate more to phyſics than medicine.

Dr Chriſt. Jac. Trew of Norimberg prefers the rectified ſpirit of grain for preſerving anatomical preparations in, to ſpirit of wine, or compoſitions of alcohol, ſuccinum, camphor, &c. becauſe theſe, he ſays, ſoon change into a brown colour, whereas the ſpirit from malt preſerves its limpid appearance. When any part is deſigned to be preſerved wet, he recommends the waſhing of it with water, till the water is no more tinctured with any blood; the water is next to be waſhed away with ſpirits, and then the preparation is to be put among the ſpirits in the glaſs where it is to

* Medicina nov antiq.
† in epiſtol.

kept; the mouth of which is to be very close covered with the glass head, over which a wet bladder and leaf-tin are tied. *Commerc. literar. Norimberg.* 1731. *semest.* 1. *specim.* ix.

We learn by private letters from Leyden, that the vessels of the crystalline humour of the eye, said in our public newspapers last year to have been discovered by Dr Albinus professor of anatomy there, are all the branches of an artery, which being sent off from the artery that enters at the central part of the retina, passes through the vitrous humour, and when it reaches the crystalline, disperses its branches along the surface of that lens like radii, till they are exceedingly minute, when they pierce into its substance.

Dr Albrecht, professor of medicine at Erford, in his anatomical observations of two men he dissected, is of opinion that the bladder of a strong man may be divided into six coats, among which he thinks the muscular ought not to be reckoned, because it consists of irregular separated bundles of fibres. He observed, that the part of a waxy injection coloured with cinnabar, which had made its way among the cellular membranes covering the coats of a vein, left the colouring powder behind it. After injecting wax into the left pulmonary vein, he remarked a vein filled with the injection, which ran up on the outside of the pleura to four or five inches distance from the vertebræ, and gave off branches to the neighbouring parts. In accounting for the phænomena of several diseases from this fact, he seems to think a communication between the pulmonary and thoracic

veſſels always to obtain. *Albrechti obſerv. anat.* § 5. 8 11.

Jo. Henr. Schulze, profeſſor of medicine at Altorff, having obſerved wax paſſing, as he thinks, through the coats of arteries and veins when theſe veſſels were injected, of which that coloured with red loſt its colour, while the green kept it, endeavours thence to account for the ſecretion of fat, and the production of an œdema. *Commerc literar. Norimberg.* 1731, *ſemeſt.* 1. *ſpecim.* v.

Mr Senac's new deſcription of the ſtructure of the diaphragm, and his remarks on the action of this muſcle are ſo very particular and connected, that they will not bear ſuch an abridgment as our deſign will allow.

Of the ſame kind are Mr Hunauld's obſervations on the ſtructure and actions of ſome muſcles of the fingers, and Mr Winſlow's account of rotation, pronation, ſupination, and other circular motions; wherefore we muſt refer all theſe three to the original papers in the *Memoires de l'acad. des ſciences*, 1729.

Mr Monro, profeſſor of anatomy here, has made ſo many additions to his *Oſteology*, and *Treatiſe of the nerves*, which he has tacked to the new edition lately publiſhed, that we cannot enter into a detail of them.

Mr Winſlow, in his *Expoſition anatomique de la ſtructure du corps humain*, has mended every where the common deſcriptions, and has added innumerable particulars that were [illegible] mentioned before him, which make any [illegible] rable account of ſuch improvements ſo much longer than our work can admit, that we can do

do no more than recommend this author to all who wish to have a very particular and genuine knowledge of the structure of the human body. He is indeed very short, and extremely reserved in explaining the functions and uses of the parts, except in his treatise on the muscles, where he shews prodigious varieties in the actions of these organs of motion, that never were so much as hinted before.

Dr Bryan Robertson of Dublin, in his *Treatise of the animal oeconomy*, has endeavoured to improve on Sir Isaac Newton's opinions concerning several parts of the animal œconomy, and supports his reasoning by a number of experiments an geometrical calculs. He shews, *first*, the laws that obtain in the motion of fluids thro' cylindrical pipes, which serve as an introduction to his account of the motion of blood in in the vessels.

Next, He argues for "muscular motion being "performed by the vibrations of a very elastic "æther, lodged in the nerves and membranes, "investing the minute fibres of the muscles, "excited by the power of the will, heat, "wounds, the subtile and active particles of "bodies, and other causes."

The *third* subject he treats of is respiration; in which he contends, "The life of animals "is preserved by acid parts of the air mixing "with the blood in the lungs, which parts "dissolve or attenuate the blood, and preserve "its heat, and by both these keep up the mo-"tion of the heart."

In the following section, he argues for digestion being owing to gentle heat and motion.

"By

" By this heat and motion the texture of the " nouriſhment is changed in the bodies of a- " nimals:" And then, " The conſtituent ſo- " lid parts of animals, according to their ſe- " veral natures, are endued with peculiar at- " tractive powers of certain magnitudes, by " which they draw out of the fluids moving " through them like parts in certain quantities, " and thereby preſerve their forms and juſt mag- " nitudes."

Secretions, according to our author, are performed thus: " The glands in the bodies of " animals, according to their ſeveral natures " and diſpoſitions, are endued with peculiar at- " tractive powers, by which they ſuck in vari- " ous juices from the blood."

In the *laſt* place, he ſhows the proportion of the diſcharges of human bodies, *viz.* of perſpiration, urine, *&c.*

Mr Winſlow, phyſician and member of the Royal Academy of Sciences at Paris, has propoſed an improvement on the ordinary manner of reducing inguinal or crural herniæ, namely, to cauſe the patient to reſt on his knees and elbows, while the ſurgeon is attempting to reduce the bowels. *Le Dran obſervations chirurgiques, tom.* 2. *obſ.* 1. *and Journal de Sçavans,* May 1732.

Mr Cheſelden, ſurgeon at London, has made a conſiderable improvement on the lateral operation for the ſtone. Inſtead of preſſing his catheter backwards, he cauſes it to be ſupported as cloſe to the conjunction of the *oſſa* as poſſible; and, after having made a large ciſion into the teguments, he preſſes the gut back-

backwards with the fore-finger of the left hand, and, having felt the furrow of the catheter with his finger, he introduces his knife with the edge directed forward and downwards upon the finger into the furrow, immediately above the ſuperior part of the proſtata; and, with the knife in the ſame ſituation, he cuts a ſmall ſhare of the ſide of the bladder, its ſphincter, the ſide of the proſtata, the ligament through which the ſmall beginning of the urethra paſſes, and the bulbous part of the urethra. After this inciſion, the gorgeret is introduced upon the fore-finger, which has been kept in the wound all this time. The forceps is quickly introduced, and the ſtone is as quickly extracted. *Douglas's appendix to the hiſtory of the lateral operation.*

Mr Garengeot, ſurgeon at Paris, has much enlarged his treatiſe of chirurgical operations, in the ſecond edition lately publiſhed; the moſt conſiderable improvements in the practical way, that we remarked to be here added, are the following:

Tom. I. p. 298. Old age is an advantage in performing the operations for herniæ; becauſe old peoples guts are not ſo liable to inflame or gangrene as thoſe of young perſons.

Ibid. p. 408. He recommends exerciſe to hydropic people, immediately before they are to be tapped, that the groſſer particles in the water of their belly may be mixed with the thinner, ſo may run out with them. And, if there is reaſon to ſuſpect any ſuch groſs parts remaining after the operation, he adviſes the injection of

of barley water to dilute them and bring them away.

Tom. II. p. 354. He describes a new way of performing the operation of the *fistula in ano*; it is this, having thrust a probe through the gut, a little higher than the bottom of the sinus, and having drawn out that end by the anus, with the finger introduced into the gut, he makes an incision parallel to the probe, at an inch distance from it on each side, and cuts out all between the incisions.

Ibid. p. 431. A new method of tying a wounded intercostal artery, the invention of Mr Goulard surgeon at Montpelier, is described; the instrument employed is a semicircular or very curve needle, that has a groove along its convex part, and two holes at some distance from each other near the point, piercing from the convex to the concave side; this needle is fixed into a long straight handle, and a thread is put through the two holes in such a manner, that its noose is on the concave side, and the two ends are on the convex, in the groove of which they are hid and brought down to the handle. When the needle is thus mounted, an incision is made cross three ribs, that where the wounded artery is being the middlemost, when these are discovered, the needle is thrust through the intercostal muscles contiguous to the upper edge of that middle rib, and about an inch farther back than where the open orifice of the artery is, and is pus[illegible] within the internal surface of the ribs do[illegible] wards, and made to pierce outwards again im[illegible] mediately below the under edge of the rib; as soon

soon as the noose of the thread on the concave side of the needle appears without the muscles, it is to be raised with a pin, and the anterior end of the thread is to be drawn out; then the needle being drawn back again, brings out the other end with it; therefore the thread, being now round the rib, is to be tied firmly on it, and the artery will be compressed.

Tom. III. p. 187. In performing the trepan, he thinks it better for the surgeon to rest his chin in a ring made with the fingers of the hand that holds the handle of the instrument, than to rest his forehead on the back of that hand in the common way.

Ibid. p. 369. He thinks it is inconvenient for surgeons to press with the palm of their hand on the back of the amputation knife in making the circular incision round a limb, but rather to make use of Mr La Peironyer's crotchet or hook at the point of the knife, into which a finger is put for directing the knife; or, if that is wanting, to take hold of the knife near its point with the thumb and fingers of the left hand.

Ibid. p. 423. He is of opinion that soft compression is much more effectual to stop hæmorrhagies than hard substances.

Ibid. p. 391. He condemns the use of vitriol buttons, even when stitches of arteries give way, and would rather trust to soft compression.

Ibid. p. 414. He advises the amputation of the fore-part of the foot when there is occasion; in doing which, the knowledge of the articulations there only can guide the operator.

The

The Chineſe ſeem to have had the method of inoculating the ſmall-pox, long before it was introduced into this weſtern part of Europe: Their method of proceeding, according to Father d'Entrecolle's account, is this; they gather the ſcabs that come off from a healthy child that has had the ſmall-pox, in a favourable way, and keep them well ſhut up in a China cup till there is occaſion for them; then taking four ſmall ones, or two large ones, and putting a grain of muſk between them, they roll them in a little cotton, and thruſt this tent into the child's noſe, where it remains till the ſymptoms of infection begin to appear. The child, on whom this inoculation is to be made, is to be more than a year old. If the puſtules appear on the firſt day of the fever, the child almoſt certainly dies; if they come out on the ſecond, the event is uncertain; if they do not ſhow themſelves till the third day, the patient probably will recover. *Lettres edifiantes & curieuſes ecrites des miſſions etrangeres, par quelques miſſionaires de la compagnie de Jeſu, tom.* 20. Paris 1731.

D. Stevens, in his Eſſay on aliments, prefixed to his tranſlation of Dolaeus on the gout, endeavours to prove the gouty humours to be rather of an alcaline than an acid nature, both from the nature of our fluids, and from the diſeaſe being moſt effectually mitigated or cured by an aceſcent diet.

An anonymus author gives a long ac[illegible] of a colic, which generally prevails in A[illegible] dam during the winter, and deſtroyed m[illegible] of the inhabitants in 1730. Its appearance is very

very like to what was formerly called the *colic of Poictou*, and is here minutely described. The principal distinguishing marks of it being its obstinacy, and bringing on convulsions, palsies, and other disorders that are commonly called *nervous*. The author redargues all the different opinions concerning the nature of this disease, and endeavours to prove it to depend on a gouty humour. *Bibliotheque raisonnée de l' Europe, tom. 8. art. 2.*

Dr Lobb, in his *Treatise* on the *Small-Pox*, seems to disapprove entirely of bloodletting in the small-pox; for the only case where he would allow of it, is in the beginning of the disease, in a patient who has a sanguine plethora, which is again confined to so many circumstances, that scarce ever such a patient will be met with.

He thinks, with Dr Boerhaave, that the disease may be prevented or cured without any eruption, but differs from the learned professor's opinion of this being done by the antiphlogistic method; and rather thinks a specific may be found: He proposes the æthiops mineral as a medicine that probably would prove such a specific, and relates some examples of the disease being, in his judgement, prevented by timely use of æthiops; but, before he would recommend it to general practice, he proposes to have sufficient trials of its effects made on malefactors, and lays down all the regimen necessary to be observed during the trials.

If Dr Lobb disclaims blood-letting in the small-pox, Dr Locher, professor of medicine at Jena, in his *Sure rules to a successful cure of*

the small-pox, recommends repeated and plentiful bleeding, and the greatest care to follow out the antiphlogistic method.

XXXIX. *A List of* Medical Books *published since the beginnng of* 1731.

JOH. Jac. Mangeti *Bibliotheca Scriptorum Medicorum, tom.* 1. *pars* 1. 2. *tom.* 2. *pars* 1. 2. *fol.* Genev. 1731.

M. Frid. Ottonis Menckenii *Lipsienſis de vita, moribus, ſcriptis, meritiſque* Hieronomi Frascatorii *Veronenſis Commentatio*, 4*to*, Lipsiæ 1731.

Hermanni Boerhaave *Sermo Academicus de honore Medici, Servitute*, 4*to*, Lugduni Batavorum 1731.

An Eſſay concerning the Nature of Aliments and the Choice of them, according to the different Conſtitutions of human Bodies. In which the different effects, advantages, and diſadvantages of animal and vegetable diet, are explained, by John Arbuthnot, M. D. Fellow of the College of Phyſicians and Royal Society, 8*vo* London 1731.

Practical Rules of Diet, in the various conſtitutions and diſeaſes of human bodies, by the *ſame Author*, 8*vo*. *London* 1732.

Joan. Philip Breynii, M. D. *&c. Hiſtoria naturalis Cocci Radicum Tinctorii, quod Polonicum vulgo audit*, 4*to*, Gedani 1731.

Prælectiones Pharmaco-mathicæ & Medicæ practicæ; or, *Lectures on the Rationale of Medicines, by* Edward Strother, M. D. in 2 vols 8*vo*, *London* 1731.

Cynoſuræ

Cynosuræ materiæ medicæ continuatio secunda ad cynosuræ materiæ medicæ Hermannianæ intentionem conscripta, publicæ luci expositа a Joh. Boeclero, *M. D. & apud Argentinenses Pr. P.* 4to, Argentor. 1731.

Codex medicamentarius, seu pharmacopœia Parisiensis, ex mandato facultatis medicinæ Parisiensis in lucem edita, M. Hyacintho Theodoro Baron *decano*, 4to, Paris 1732.

Institutiones chirurgicæ; or principles of surgery, comprehending and explaining the general intentions of all the principal branches of that science; by *G. Smith* of *Kendal*, apothecary and surgeon, 8vo, *London* 1732.

Helmontius Ecstaticus, sive visa medicaminum potestas ab Helmontio somniante, revisa a vigilante Jo. Henr. Cohausen. *M. D.* 8vo, Amstelod. 1731.

Geo. Ernesti Stahlii *experimenta, observationes, animadversiones* ccc *numero chymicæ & physicæ, &c.* 8vo, Berolini 1731.

Hermanni Boerhaave *elementa chymiæ quæ anniversario labore docuit in publicis privatisque scholis*, in 2 tom. 4to, Lugdun. Batav. 1732.

Nouvelle osteologie, ou description exacte des os du corps humain, accompagnée des remarques chirurgicales sur le traitement de leurs maladies, & enrichie de figures en tailledouce, par Jean Palfyn, *demonstrateur en chirurgie a Ghent*, 12mo, Paris 1731.

Osteologie, ou traite des os, par Jean Baget *maitre-chirurgien a* Paris, 12mo, 1731.

The anatomy of the human bones; to which are added, an anatomical treatise of the nerves; an account of the reciprocal motions of the

heart, and a deſcription of the human lacteal ſac and duct, by *Alexander Monro* profeſſor of anatomy, *&c.* the ſecond edition, corrected and enlarged, *8vo*, *Edinburgh* 1732.

Joh. Wilh. Albrechti, M. D. & Pr. *obſervationes anatomicæ circa duo cadavera maſculina*, *4to*, Erfurti 1732.

Embryologia hiſtorico-medica, hoc eſt, infantis conſideratio phyſico-medico-forenſis, qua ejuſdem nutritio, formatio, &c. exhibenter, a D. Martino Schurigio *phyſico Dreſdenſi*, *4to*, Dreſdæ 1731.

Laurentii Heiſteri *Profeſſoris publici Helmſtadienſis, &c. compendium anatomicum. Editio quarta, prioribus longe auctior atque emendatior*, in 2 tom. 8vo, Norimberg. & Alterf. 1732.

Expoſition anatomique de la ſtructure du corps humain, par Jaques-Benigne Winſlow *docteur en medicine*, &c. *4to*, or in 5 tom. *12mo*, Paris 1732.

Henr. Baſſii *obſervationes anatomicae & chirurgo-medicæ, in quatuor decades digeſtæ, variis obſervatis rarioribus exornatæ, & ſolidis medicæ ſcientiæ principiis ſuperſtructæ, cum fig.* 8vo, Halae 1731.

Diſſertationes phyſico-mathematicae, partim antea editæ in actis philoſoph. Londin. jam auctiores & emendatiores, partim nunc primum impreſſæ, auctore Jacobo Juryn, M. D. Londin. 1732.

A treatiſe on the animal œconomy, by *Bryan Roberſon*, M. D. *8vo*, *Dublin* 1732.

An appendix to the hiſtory of the lateral operation for the ſtone, containing Mr *Cheſelden's* preſent manner of performing it, by *James Douglas*, *4to*, *London* 1731.

Ob-

Observationes chirurgicae de calculo renum veſicae, urethrae, lithotomia, veſicae punctura, in quibus lithotomiae methodum quam celeberrimus Jo. Jac. Ravius *Anat. P. exercuit tutiſſimam et feliciſſimam omnium hucuſque inventarum methodorum eſſe variis experimentis et rationibus probat* Jacob. Denys, *chirurgus Leydenſis*, &c. 8*vo*, Lugd. Batav. 1732.

Parallele des differentes manieres de tirer la pierre hors de la veſſie, par Henry Francois le Dran, *chirurgien à Paris*, &c. 12mo, *à* Paris 1731.

Obſervations de chirurgie auxquelles on a joint pluſieurs reflections en faveur des etudiens, par Hen. Franc. le Dran, *à* Paris 1731.

De gezuiverde Heelkonſt, ter onderwyzinge van den Leerende en konſt oefenenden Heelmeeſter door Joh. de Gorter, M. D. P. 8*vo*, *tot* Leyden 1731.

Traité des operations de chirurgie, par René Jacques Croiſſant de Garengeot, *chirurgien à Paris*, &c. in 3 tom. 12*mo*, 1731.

Lettre écrite au Sieur René-Jacques Croiſſant Garengeot, *maitres des artes de Bourges*, &c. *au ſujet de la nouvelle edition de ſon traité des operations de chirurgie*, 12*mo*, *à* Paris 1731.

Diſſertationes medico-chirurgicae juxta circulationis leges, autore Hugone Gourraigne, M. D. *& Pr.* 8*vo*, Montpelier 1731.

Conſpectus chirurgiae & medicinae, methodo Stahlianâ conſcriptus, autore J. Junkero, M. P. P. Halæ 1731.

Inſtitutiones medicinae theoreticae phyſiologiam & pathologiam complectentes, autore Antonio Deidier, M. D. *chemiae Pr. Montpelienſi*, &c. 12*mo*, Paris 1731.

Elementorum medicinae physico-mathematicorum, tom. I. *autore* Jo. Fred. Schreiber *Regiomontano*, 8*vo*, Francofurti & Lipsiae 1731.

Christ. Godofr. Stenzelii, M. D. *in academia Vitembergensi Pr. medicina theoretico-practica aphorismis in usum auditorum suorum comprehensa*, 8*vo*, Francofurti & Lipsiae 1732.

Medicinae compendium in usum exercitationis domesticae digestum, cui accedit, 1. *Oratio de praxis medicae repurgatae certitudine.* 2. *Oratio de animi & corporis consensione mirabili in secunda quam adversa valetudine, autore* Johanne de Gorter, *M. D. & Prof.* 4*to*, Lugdun. Batav. 1731.

Hygieine sive tutrix corporis humani, modum ostendens quo homines absque medicamentis aetatem suam in statu naturali sano ac vegeto in seram usque senectutem protrahere valeant, tam ex veterum ac neotericorum auctoritate quàm ex propria animadversione desumpta, à Jo. Franc. Paulo Ganser, *Phil. & M. D.* Lipsiæ 1731

Roberti Welsted *tentamen de variis hominum naturis remediisque ad singulas accommodandis, ubi morbi earum sive simplicium, sive mixtarum affines notantur, ex quibus nata symptomatum diversitas exploratur, ipsaeque sanandi rationes deducuntur*, 8*vo*, Londin. 1731.

Febrium continuarum quae anno 1729 *Vratislaviae grassatae sunt recensio, occasione Catarrhi febrilis per Europam epidemici adornata, à* Jo. Gothofr. Hahn *Phil. & Med. D. accedit dissertatio de aeris inspirati in pulmones effectu*, 4*to*, Vratislaviæ & Lipsiæ 1731.

Archeus febrium faber & medicus, sive excitatio medico-practica de usu & methodo rationali solida,

ſolida, certa, et ſecura, tam in febribus intermittentibus quam periodicis continuis adminiſtrandi febrifugorum omnium maximum corticem Peruvianum ſeu Chinam, autore Jo. Henr. Cohauſen, *M. D.* 8*vo*, Amſtelod. 1731.

A vindication of a late eſſay on the tranſmutation of blood, containing the true manner of the digeſtion of our aliments, and the ætiology, or an account of the immediate cauſe of putrid fevers or agues: As alſo, obſervations upon the noble ſpecific *cortex peruvianus*. To which is added, by way of appendix, a diſſertation concerning the manner of the operation of chalybeat waters, in oppoſition to the received opinion of their operating by their pondus, &c. founded upon experimental obſervations, and demonſtrable principles, by *Thomas Knight*, M D. 8*vo*, *London* 1731.

Obſervations in phyſic, both rational and practical, with a treatiſe of the ſmall-pox, by *Thomas Apperly*, M. D. 8*vo*, *London* 1731.

A treatiſe of the ſmall-pox in two parts, by *Theophilus Lobb*, M. D. 8*vo*, *London* 1732.

Remedio alle catarrali moleſtie, ed in conſeguenza a qualſi voglia inflammazione, ed a qualunque altra malattia derivante, &c. di Sebaſtiano Rotano, 4*to*, *in* Verona 1731.

A mechanical diſſertation on the *lues venerea*, proving the certainty of curing that diſeaſe without ſalivation, by *J. S.* ſurgeon 8*vo*, *London* 1732.

Dolæus upon the cure of the gout by milk-diet; to which is prefixed an eſſay upon diet, by *William Stephens*, M. D. F. R. S. 8*vo*, *London* 1732.

Aretæ

Aretæi Cappadocis *opera, cum commentariis integris* Petri Petit *Pariſienſis, atque clariſſimi* Joannis Wiggani *doctis & laborioſis notis, & celeberrimi* Mattairii *opuſculis in eundem, tandemque eruditiſſimi* Dan. Wilh. Trilleri *obſervationibus & emendatis; editionem curavit* Hermannus Boerhaave, *fol.* Lugdun. Batav. 1731.

Philoſophical Tranſactions, giving ſome account of the preſent undertakings, ſtudies, and labours of the ingenious in many conſiderable parts of Europe, for the year 1731, and ſome part of 1732, *4to, London.*

Hiſtoire de l'Academie royale des ſciences année 1720, avec les memoires de mathematique, et de phyſique, pour la même année, tirées des regiſtres de cette academie, 4to, à Paris 1731.

Miſcellanea phyſico-medico-mathematica Vratiſlavienſia, odor angenehme curieuſe und nurliche Rachrichten, &c. anni 1727, trimeſt. 1. 2. 3. 4. Erford 1731, 4to.

Bononienſis ſcientiarum et artium academiae commentarium, tomus prior, 4to, Bononiæ 1731.

Actorum medicorum Berolinenſium in incrementum artis et ſcientiarum collectorum, Dec. 3. tom. 1. 8vo, Berolin. 1731.

Commercium literarium ad rei medicae et ſcientiae naturalis incrementum inſtitutum, quo quicquid noviſſime obſervatum, agitatum, ſcriptum, vel peractum eſt, ſuccincte dilucideque exponitur, anni 1731, ſemeſtre 1. 2. 4to, Norimberg 1731.

——Anni 1732, ſemeſtre 1. ibid. 1732.

Diſſertationes medicæ quas ex auctoritate amplisſimi ſenatus academici Edinburgenſis, et nobiliſſimæ in eadem academia facultatis medicæ decreto,

creto, progradu doctoratus, summisque in medicina honoribus et privilegiis rité ac legitime consequendis, examini subjecerunt.

Jacobus Mallison Anglus, *De Pleuritide.*

Georgius Grieve Scotus, *De Secretione Bilis.*

Joannes Sutton Anglus, *De Rachitide.*

Joannes Jamieson Scotus, *De Infantum morbis ab infantia ortis.*

Samuel Kay Anglus, *De Nephritide.*

Jacobus Dalrymple Scotus, *De Tympania*, 1731.

Joannes Armstrong Scotus, *De Tabe purulenta.*

Robertus Paterson Scotus, *De Scorbuto*, 1732.

XL. *BOOKS promised, and proposed to be soon published.*

THOMAS SHORT, M. D. has published proposals, and is taking in subscriptions for publishing *the natural, experimental, and medicinal history of the mineral waters of* Yorkshire, Derbyshire, and Lincolnshire.

In the press *Pharmacopœa Leovar densis sexa editio, revisa et emendata.*

Pharmacopœa Edinburgensis editio tertia, recognita et emendata, is now preparing for the press by the *college of physicians here.*

Mr Chesselden, surgeon to her Majesty, and to St Thomas's hospital, will, it is expected, publish his large osteology this ensuing winter.

Jo. Christoph. Bohlius, M. D. of Koningsberg, is said to be about to publish Παλάξια *corporis animalis occasione experimenti Gedani de ductu thoracico capti.*

A proſpectus is publiſhed of a work that is ready for the preſs in Suabia, under this title, *Summaria hiſtoriæ abortuum molarumque diverſarum excluſarum.*

The *Academia Naturæ Curioſorum* in Germany have advertiſed their deſign of publiſhing ſoon the third volume of their *Acta Phyſico-medica.*

Jo. Phil. Burggrave junior, phyſician at Francfort on the Maine, has publiſhed a ſpecimen of a *Lexicon medicum univerſale*, which he propoſes to make compleat in ſix ſmall volumes in folio, the price of each of which is to be half a ducat.

The Weſteins and Smith, bookſellers in Amſterdam, are alſo about to publiſh, in two volumes 4to, a book under the ſame name of *Lexicon medicum univerſale*, compoſed by Theodorus Tronchin and *Ludovicus de Neufville*, M. D. D.

A private ſociety at Norimberg are preparing materials for correcting and enlarging greatly *Merklin's Lindenius renovatus:* They deſign not to hurry their work, and by that means to make it the more correct and compleat.

Edward Milward, M. D. has diſperſed propoſals for printing a beautiful edition of Alexander Trallianus's works, to conſiſt of 200 ſheets folio: The ſubſcription price two guineas.

Francis Clifton, M. D. propoſes to publiſh *Hippocrates's* works in three large volumes 4to, at two guineas ſubſcription.

Dr *Friend's* works are now printing at London in one volume folio.

Dr *Albinus*, profeſſor of anatomy at Leyden, is ſaid to deſign the publication of a very exact

exact copy of Euſtachius's tables, with an accurate explication of them. A good number of the plates are already finiſhed, and he has been preparing the text theſe ſeveral years.

Mr Winſlow, in the prefatory advertiſement to his *Expoſition anatomique*, propoſes to publiſh 80 original copper-plates in folio, repreſenting all the parts of the human body, with Latin and French explications.

Such a work is much wanted; therefore we are perſuaded royal bounty or generons ſubſcriptions will enable him to finiſh ſo uſeful an undertaking that already is conſiderably advanced: otherwiſe the public is in hazard of making an irreparable loſs: becauſe he ſays very juſtly, "*He foreſees* "*this work will be too great for a private man,* 'Surpaſſera les forces d'un particulier.'

XLI. *SOCIETIES lately formed for the Improvement of Phyſic.*

A Chirurgical Academy is lately inſtituted by public authority at Paris; the members of which are not only to publiſh their own and correſpondents obſervations and improvements, but are to give an account of all that is publiſhed in ſurgery, and to compoſe a compleat hiſtory of this art, by their extracts from all the authors ancient or modern who have wrote on this ſubject. This academy is alſo to propoſe a queſtion in ſurgery every year; whoever gives the moſt ſatisfactory anſwer is to be rewarded with a golden medal of 200 livres value. The queſtion propoſed this firſt year

year is, *Why ſome tumors are to be extirpated, and others are only to be opened; what are the circumſtances in both theſe ways of operating which make the cautery preferable to cutting; and what are the reaſons of preference?*

Another ſociety is alſo lately erected at Paris, under the protection of the Count of Clermont, and is named the *Academy of Arts*; by which it is propoſed, that all arts are to be conſiderably promoted, both by the labours of the members of the academy, and by the aſſiſtance and encouragement given by them to others who propoſe any uſeful diſcoveries and improvements. Among the arts about which this academy is to be employed, ſeveral branches of medicine are comprehended.

The king of Sweden has founded a ſociety at Upſal, much on the ſame footing with the Academy of Sciences at Paris.

It is talked in Germany, that the phyſicians at Stuttgard deſign to publiſh their *Acta* in the ſame form as the Berlin Tranſactions are.

The Hungarian phyſicians are ſaid to have entered into the reſolution of forming themſelves into a ſociety, and of publiſhing their obſervations.

The End of the Firſt Volume.

To the BOOKBINDER.

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