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APPENDIX

[The text in this section is extremely faint and illegible. It appears to be a list or index of items, possibly names of people or places, arranged in a structured format. The text is too light to transcribe accurately.]

ACCOUNT of the Rain that has fallen at Dunse, in Berwick-shire, from the 1st of October 1768 to the 1st of October 1769, the perpendicular Depth being expressed in English Inches and Decimal parts, by Dr William Dunbar Physician.

1768.	Inches:
In October,	3.937
November,	2.222
December,	2.628
1769.	
In January,	1.805
February,	1.965
March,	0.854
Total in the six winter months between the autumnal and vernal equinoxes	13.411
In April 1769,	1.850
May,	2.940
June,	1.072
July, almost the whole of which fell after the 26th day,	1.173
August,	3.382
September,	2.739
Total in the six summer months between the vernal and au- tumnal equinoxes,	13.156
Total from the 1st of October 1768 to the 1st of October 1769,	26.567

THE mouth of the funnel that collected the water, measured exactly 288 square English inches; was set horizontal, in a place pretty equally exposed to every wind; and the water was received into a large glass bottle, with a narrow mouth, and was carefully covered from the sun, to prevent evaporation.

THE water was all weighed, and 251 English Troy grains allowed to each cubical English inch of rain-water.

I thought it most proper to begin with the month of October, rather than January, in order to distinguish between the proportion of rain that fell in the winter and summer seasons, which are adapted to very different operations; and I propose to keep a regular account of the rain for some years; so that, by striking a medium, one may be able to form a tolerable judgment in which month the greatest or smallest quantity of rain may be expected; which may be of use in carrying on works which require dry or wet weather.



IN January, almost the whole rain fell before the 14th day; and, in February, almost the whole fell after the 17th; upon which day the barometer stood so low as 28.2 inch. wind west, with severe showers of hail and snow. Upon the 15th of July, the barometer stood at 29.5 inch. wind north, with  $1\frac{1}{2}$  inch perpendicular of rain, which fell in 12 hours time.

OUR heaviest and most continued rains come from the easterly points, (especially the south-east); though we often have long and severe droughts from that quarter, when the wind does not rise high. From the north, with a high wind, we often have very heavy rains; but generally attended with frequent intermissions. The rains from the south are pretty frequent, generally thick and continued, but seldom of very long duration. The west and north-west are our driest winds; though, from these points, we often have showers, but seldom of long continuance.

THE observations upon the barometer were generally made about nine in the morning.

METEOROLOGICAL *Observations collected*  
by \_\_\_\_\_

THE following meteorological tables are intended to shew, at one view, the difference of climate between Edinburgh and the other places at which observations have been made. It may be supposed that this is not so very accurate as it would have been, if the observations taken at different places had been taken at the same times of the day; but this will occasion no great difference; and it may be ascertained by observations made with regard to the difference of heat, at different times of the day, which are now making here.

THE tables sufficiently shew, that, in every climate where observations have been made, the mean heat, height of the barometer, &c. of one year, compared with those of others, differ but very little; and therefore, if observations were made at different places for some years together, we might, from the mean heat, &c. of several years, find a very exact measure by which we may compare different climates.

ABSTRACT of the Observations of the Weather made at Edinburgh, Latitude 55 d. 57 m. 17 s. Longitude 3 d. 14 m. 45 s. W. of Greenwich, between 7 h. A. M. and 8 h. P. M.—Above the level of the Sea, about 270 Feet, Thermometer kept on the outside of a North Window.

1 7 3 2.				1 7 3 3.		
Months.	M Bar.	M Ther.	Rain.	M. Bar	M Ther.	Rain.
January	29.3	34.74	1.282	29.8	38.39	1.370
February	29.4	42.05	2.409	29.6	39.76	2.525
March	29.6	42.05	0.793	29.6	39.76	2.638
April	29.5	43.88	3.106	29.7	47.53	2.818
May	29.5	50.28	4.627	29.8	52.56	0.083
June	29.8	58.96	1.196	29.8	59.41	2.138
July	29.7	58.04	3.199	29.7	61.24	0.638
August	29.9	55.30	1.625	29.6	54.85	2.675
Septem.	29.6	50.28	—	29.6	50.28	1.835
October	29.3	45.25	2.523	29.8	44.33	1.083
Novem.	29.8	37.02	0.415	29.7	43.88	0.326
Decem.	29.8	36.11	3.617	29.5	43.42	3.629
Medium	29.6	46.16		29.68	47.95	19.758

1 7 3 4.				1 7 3 5.		
Months.	M. Bar.	M. Ther.	Rain.	M. Bar.	M. Ther.	Rain.
January	29.9	34.74	0.593	29.5	36.57	2.995
February	29.6	42.51	0.595	29.7	35.65	3.502
March	29.5	45.25	2.122	29.3	39.76	5.375
April	29.8	50.28	1.006	29.7	45.71	1.630
May	29.8	49.82	3.313	29.8	49.82	0.720
June	29.8	57.59	2.210	29.7	56.22	
July	29.7	58.96	0.709	29.7	59.42	
August	29.6	55.30	1.285	29.8	57.59	
Septem.	29.6	49.36	1.172	29.6	49.36	
October	29.5	41.59	1.321	29.9	43.88	
Novem.	29.9	37.02	1.608	29.5	42.51	
Decem.	29.0	36.11	2.332	29.7	38.39	
Medium	29.64	46.54	18.266	29.66	46.24	14.222

OBSERVATIONS made at Plymouth, Latitude 50 d. 26 m.  
Longitude 4 d. 18 m. 51 s. W. by Dr Huxham, about  
8 h. A. M. and 6 h. P. M.—Bar. till July 1733, 46  
feet, after that 30 feet, above the level of the Sea.

Thermometer kept in a North Room without Fire.

1732.				1733.		
Months.	M. Bar.	M. Ther.	Rain.	M. Bar.	M. Ther.	Rain.
January	29.6	47.08	3.564	29.76	51.50	2.384
February	29.7	53.02	2.924	29.64	50.35	3.734
March	29.61	53.02	3.174	29.40	50.78	3.098
April	29.44	54.12	2.196	29.60	57.98	2.284
May	29.46	59.42	2.424	29.54	61.87	1.010
June	29.61	66.19	1.270	29.49	67.99	1.534
July	29.56	67.48	2.288	29.42	71.30	0.772
August	29.53	68.13	0.362	29.48	65.76	4.500
Septem.	29.6	63.60	3.050	29.63	61.65	1.978
October	29.29	61.29	6.342	29.73	55.10	2.026
Novem.	29.9	48.76	0.584	29.79	53.66	1.882
Decem.	29.57	49.63	4.918	29.58	53.01	4.688
Medium	29.57	57.64	33.096	29.59	58.41	29.888

1734.				1735.		
Months.	M. Bar.	M. Ther.	Rain.	M. Bar.	M. Ther.	Rain.
January	29.95	45.60	1.480	29.68	45.67	2.526
February	29.64	50.13	5.554	29.74	47.25	1.978
March	29.50	54.09	2.812	29.39	49.84	2.234
April	29.63	57.26	2.126	29.53	55.15	2.252
May	29.43	58.56	1.764	29.64	57.69	1.646
June	29.44	66.04	3.208	29.52	62.66	1.936
July	29.43	67.20	2.982	29.41	63.67	3.536
August	29.39	66.69	4.022	29.60	65.54	2.906
Septem.	29.61	58.99	1.752	29.62	62.59	1.918
October	29.58	52.08	3.154	29.65	54.45	2.756
Novem.	29.81	46.53	2.068	29.45	53.16	4.922
Decem.	29.33	46.96	6.192	29.62	49.70	2.368
Medium	29.56	55.84	37.114	29.57	55.61	30.974

Observations of the Weather made at Hawkhill, near Edinburgh, Latitude 55 d. 58 m. 10 s. Longitude, 3 d. 12 m. 45 s. W. at 8 h. A. M. Barometer 103 feet above the level of the Sea, there being 12 feet water at Leith.

Thermometer kept on the outside of a North Window.

Months.	1784.	1765.	1766.	1767.	1768.
	M. Th.				
January	35.73	39.17	34.11	31.06	32.56
February	37.30	32.18	33.78	40.43	37.51
March	38.16	39.51	37.61	38.43	39.74
April	44.10	44.57	45.86	44.89	46.76
May	52.94	52.64	46.48	49.40	53.19
June	56.40	54.50	54.83	53.93	55.30
July	60.30	59.05	59.54	56.97	58.93
August	57.86	57.05	59.76	60.14	59.00
Septem.	51.06	51.76	51.66	54.70	51.13
October	46.28	47.02	46.42	45.48	46.78
Novem.	38.19	36.86	42.80	42.84	39.86
Decem.	35.74	35.16	37.28	38.89	38.66
Medium	46.19	45.79	45.84	46.43	46.62

Months.	1769.		1770.			
	M. Bar.	M. Th.	M. Bar.	M. Th.	Rain.	Evapo.
January		34.69	29.89	38.63	0.730	0.330
February	29.52	35.95	27.79	40.32	1.188	1.038
March	29.85	41.09	29.70	35.30	0.836	1.086
April	29.74	45.63	29.67	41.59	1.987	2.287
May	29.89	51.06	29.83	48.64	2.442	2.792
June	29.77	55.17	29.63	54.06	2.681	3.831
July	29.91	60.66	29.88	57.55	1.739	3.039
August	29.53	56.63	29.93	58.53	1.345	2.695
Septem.		54.03	29.63	55.23	3.356	1.356
October		45.53	29.53	45.63	1.204	0.979
Novem.	29.75	39.93	29.49	38.13	6.778	0.503
Decem.	29.72	40.04	29.52	37.18	3.590	0.440
Medium	29.75	46.69	29.70	45.94	27.876	20.376

# ESSAYS

AND

OBSERVATIONS,

PHYSICAL AND LITERARY.

## ARTICLE I.

*An Essay on Marle, by the late Doctor AINSLIE  
Physician.*

### INTRODUCTION.

**I**N many parts of this country the value of land has of late been greatly raised by the application of marle. It is divided into shell-marle and earth-marle. Shell-marle is composed of animal shells dissolved. Earth-marle is a fossil. Its colour is various ; white, blue, black, red. Its hardness is as various as its co-

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four ;

lour; sometimes it is soft and ductile like clay; sometimes it is hard and solid like stone; and sometimes it is extended into thin beds like slate. Shell marle is easily distinguished by the shells which always appear in it. But the similarity betwixt earth-marle and many other fossi substances, renders it difficult to distinguish them.

MARLES, like all the subjects of the mineral kingdom, differ in their degrees of purity. But how to discover, with certainty, the purity of any given marle, is not generally known.

FROM these circumstances, we must conclude, that marle, tho' a substance of inestimable value, hath scarce ever been the subject of an attentive inquiry.

IN the following essay it is proposed, first, to analyse the different marles, as newly dug from the ground; and afterwards to examine what changes they suffer from being exposed to the air.

## SECTION I.

THE most known properties of marle are, its effervescing with acids \*, and fertilizing the soil to which it is applied. By these two properties I was directed in the prosecution of my inquiry.

## AMONG

\* I know that Dr Hill, in his volume upon Fossils, has ranked among marles many substances which do not effervesce with acids. But I cannot see by what reason such an arrangement can be justified. Perhaps, all the substances which we find in the class of marles have, with advantage, been employed in agriculture. But that is not sufficient. We know that pure clay itself, applied to certain soils, produces the most happy effects. All Dr Hill's non-effervescent marles are possessed of the distinguishing properties of clay; and therefore ought in justice to be ranked among the argillaceous bodies. After comparing this author's definition of marle with his definitions of clay and bole, I can fix upon no particular character by which the first of these substances may, with certainty, be distinguished from the other two. Marle seems by his definition to differ from clay and bole in degree of viscidty only. But, how shall the degree of viscidty which constitutes a clay, or a marle, or a bole, be ascertained? A very considerable number of earth-marles are of a stoney hardness; but all marles, by Dr Hill's definition, cohere slightly.

#### 4 ESSAYS AND OBSERVATIONS

AMONG the subjects of the mineral kingdom, some are soluble in water, some not. Of the first, one only, the fossil alkali, is possessed of properties similar in any degree to those of marle. For this salt, which is collected principally along the coasts of the Mediterranean sea, effervesces violently with acids, and has been, time immemorial, in the highest esteem as a manure. From these circumstances it might be suspected, that a very intimate affinity subsists betwixt this alkali and marle, and that the similar effects of both these substances proceed from the same cause. To satisfy myself with regard to this particular, I made the two following experiments.

#### EXPERIMENT I.

Two drachms of clay-marle, newly dug from the pit, were put into an ounce of water, and for twelve hours digested with a considerable heat. The marle, when separated by filtration and dried, retained precisely its original weight. The digested water was devoid of taste and  
smell,

smell, and suffered no change from the addition of syrup of violets, or the acid of nitre. The event was in every respect the same, when a quantity of the same marle was boiled in water for a considerable time. Many varieties of clay, stone, and slate marles were treated in the same manner, with the same appearances.

## E X P E R. II.

Two drachms of newly dug shell-marle, free from moss, fragments of putrid-wood, &c. and previously dried, were digested as in the first experiment. The marle neither lost any of its original weight, nor communicated to the water any thing discoverable by the trials mentioned above. The appearances were the same when this marle was boiled in water\*.

FROM

\* CAUTION is necessary here. Shell-marle not only contains many separate fragments of putrid wood, but is also very commonly mixed with parts of the mossy stratum, under which it is generally found. If marle, containing either of these substances, is employed in the preceding experiment,

## 6 ESSAYS AND OBSERVATIONS

FROM these experiments it is evident, that no salt, similar to the fossil alkali, is contained in marle. For all natural salts of an alkaline quality, are distinguished by their easy solubility in water, by effervescing with acids in the same manner when dissolved, as before solution, and by converting the colour of blue or purple vegetable infusions into green. But marle, neither when digested, nor when boiled in water, communicates any of its substance to that fluid; therefore contains nothing soluble by it, nor any salt of an alkaline, or any other nature. Besides, none of the waters, filtered from the marles in the preceding experiments, suffered any change from the instillation of the nitrous acid, or of the syrup of violets.

From

experiment, it never fails to communicate a bitterness and peculiar smell to the water. Besides these properties, this water, upon the addition of any alkaline solution, acquires a milky hue, and lets fall a small quantity of a white powder. That these effects proceed solely from the heterogeneous bodies mixed with the marle, is evident from this, that shell marle, when perfectly pure, and freed by evaporation from mossy water, never communicates any perceptible quality to water in which it is digested.

From these circumstances it is manifest, that marle does not contain the smallest proportion of an alkaline salt. And, as no other salt will account for the phænomena, this, added to some particulars mentioned above, renders any farther search for a saline substance in marle unnecessary.

## S E C T. II.

BEING satisfied with regard to this particular, the affinity betwixt calcari-ous earths and marle next occurred to me. Calcarious earths effervesce with acids, are remarkable for their fertilizing properties, and cannot, in a natural state, be dissolved by water. So far they agree exactly with marle. But their most characteristical qualities are, their dissolving entirely in the mineralacids, and calcining to quicklime. By these two properties, such earths may be distinguished, wherever they occur.

WITH a view to the apparent affinity betwixt calcari-ous earths and marle, I made the following Experiments.

E X P E R.

## E X P E R. III.

To a drachm of newly dug stone-marle, reduced to powder, I gradually added the muriatic acid, till no further effervescence ensued upon the addition. This mixture, diluted with a sufficient quantity of water, was thrown into a filter of gray paper: A pure pellucid liquor passed through, and a gross earthy substance remained behind at the bottom of the filter. This substance, when properly washed and dried, weighed just eighteen grains.

IN this experiment, we find the marle divided into two different parts; the one carried off by the muriatic acid, and invisibly suspended in it; the other an earthy substance, on which that acid seems to have no influence. Having advanced thus far in the decomposition of our subject, the next step is to examine into the nature of these two constituent parts.

## S E C T. III.

## E X P E R. IV.

THE substance which remained in the filter possessed, almost in every respect, the properties of clay. In drying it concreted into a mass of considerable hardness; made no effervescence with any of the acids; fell down and diffused readily in water; and was, by the action of fire, converted into a reddish-coloured brick. Twenty grains of such a substance extracted from the same marle gave, by elutriation\*, 5 grains of sand. Hence the nature of the unfoluble part of this marle is abundantly evident.

IT must be remarked, however, that neither the quantity nor composition of this unfoluble part is, in any two marles, precisely the same. Clay, or clay and

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sand,

\* This term is applied to the separation of clay from sand by means of water,

sand, are, it is true, the constituent parts of it in all marles \*; but the different proportions, in which these are mixed with the soluble part, are almost infinite.

### EXPER. V.

THE residue of a drachm of clay-marle, which was easily diffusible in water, weighed 40 grains, and consisted of equal proportions of clay and fine sand.

### EXPER. VI.

A drachm of another clay-marle contained fifteen grains of un溶uble matter, which was altogether clay.

### EXPER.

\* It must be observed, that the residue of all or most maries contains, besides clay and sand, a considerable number of flat shining particles. These particles are un溶uble in acids, as is evident from their remaining in the residue. Few of them suffer any diminution of lustre in the fire. Whence they appear to be flakes of foliaceous talc.

## EXPER. VII.

FORTY grains of a smooth laminated marle afforded eight grains of a clay *residuum*.

## EXPER. VIII.

THE residue of 40 grains of a stone-marle weighed 12 grains, a third of which was sand.

## EXPER. IX.

A drachm of another stone-marle gave only nine grains of unfoluble matter, mostly clay.

## EXPER. X.

THE residue of 40 grains of another stone marle \* weighed 16 grains, 13 of which were sand.

## EXPER.

\* I have here given the name of marle to some substances which perhaps, in strict language, ought to go under  
under

## EXPER. XI.

A drachm of a friable slate-marle afforded a *residuum* of 18 grains of yellow sand.

## EXPER. XII.

A drachm of limestone contained 12 grains of unsoluble matter, which was altogether sand.

## EXPER. XIII.

A drachm of another limestone gave only six grains of residue, which appeared to be a slime.

## EXPER. XIV.

A drachm of shell marle, dug out at the depth of two feet from the surface, contained

der another denomination ; but they are generally accounted marles, and employed as such indiscriminately with the marley *strata* contiguous to them.

ed 3 grains of unſoluble matter, which acquired little cohesion by drying, and conſiſted in a great meaſure of a very fine ſand.

THESE are the moſt remarkable differences that have hitherto occurred to me in examining the *reſidua* of different marles. I thought it neceſſary to give a detail of them, both becauſe the compoſition of the unſoluble part of our ſubject is thereby demonſtrated, and becauſe the preceeding experiments will afterwards ſerve to explain a difficulty which would not otherwiſe admit of an eaſy ſolution.

#### SECTION IV.

WE muſt now return to the pellucid liquor which paſſed thro' the filter in Experiment 3. As this liquor contains, in an inviſible ſtate, the ſubſtance which, in combination with the part examined in Section 3 compoſed the original marle; if we can diſcover the  
nature

nature of that substance, the nature and composition of marble will of consequence be evident

An alkaline salt, added to the solution of any other substance in an acid liquor, instantly precipitates that substance. The part of the marble dissolved and carried off by the muriatic acid in Experiment 3. had no affinity to an alkaline salt \* ; therefore a salt of this nature, added to that solution, cannot fail to separate from it the soluble part of our subject, and consequently to give us an opportunity of examining it to greater advantage.

#### EXPER. XV.

WITH this view the forementioned filtered liquor was mixed with a small quantity of a solution of salt of tartar. The mixture became immediately milky and turbid; but in a short time recovered its transparency by the copious precipitation

\* See Exper. I. 2.

pitation of a whitish powder. More of the alkaline solution was then added; and as a new lactescency and precipitation ensued, the addition was from time to time repeated, till it produced no such effect. Then it was evident, that whatever the acid had carried off from the marle, was now thrown to the bottom. The precipitated powder, when separated by filtration, washed, and dried, weighed precisely 42 grains; which, added to the 18 grains of un-soluble matter in Experiment 3. makes up the original weight of the marle employed in that experiment. This powder was altogether insipid; suffered no change from water; and was, after a very brisk effervescence, totally dissolved both by the acid of nitre and of sea salt.

The liquors filtered off from the un-soluble matters in all the experiments related in Section 3. were separately treated in the manner described above, and in every respect with the same appearances: Particularly, the weight of each of the precipitated powders, added to

that

that of its respective residue, equalled, with remarkable exactness, the original weight of the marle from which it had been extracted.

## S E C T. V.

THESE precipitated powders are totally soluble in acid spirits; for it was by this solution that we obtained their separation from the other parts of the marles in which they existed. The knowledge of this single property, however, is not sufficient to determine their nature. The changes produced upon them by the action of fire must be also considered.

## E X P. E R. XVI.

FOR this purpose, seventy grains of powder, extracted, in the manner described above, from the marle of Experiment 3. were for two hours detained in a strong fire. The weight of the powder was thereby reduced to 40 grains, and its colour

lour

four from white changed to grey or ashy. When water was poured upon this calcined substance, many air-bubbles rose to the surface with a hissing noise, and as strong lime-water was in a short time produced as I had ever obtained from any quick-lime.

THE calcination of the powders extracted from the other marles was attended, in every circumstance, with the same success; that from shell-marle not excepted.

FROM these experiments, I think, the nature of marle is sufficiently evident\*.

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C

Marle

\* HERE it may be asked, if such is the composition of all earth-marles, whence comes it, that some earths of that kind, or what strongly resembles them, are so destructive to the growth of vegetables? In answer to this, it must be remarked, that many fossils, differing widely in their nature from marle, have frequently, from resemblance, been employed as marle. Among the fossils of this country, is oft-times found a species of the Pyrites, *Lapis atramentosus* of Cramer, which in colour nearly resembles some of the earth-marles. I have seen a bed of this which contained a considerable proportion of calcarious earth. It may occur among beds of marle; but, whenever it is employed in agriculture, its effects must be unfavourable.

Marle consists of two parts, possessed of very opposite qualities. The one, clay, or a mixture of clay and sand; the other, a substance soluble in acids, convertible by calcination into quick-lime, and consequently a real calcarious earth, differing in no respect from the calcarious earth of lime-stone and the shells of animals.\*

FROM the foregoing experiments it is also manifest, that the nature of clay-marles, stone-marles, and slate-marles, is altogether the same. For marles of equal purity, and consisting of the same proportions of constituent earths, are found under all these different appearances. Different names have been affixed  
to

\* THE very essence of marle seems to consist in this earth; for that name is bestowed on no substance that does not contain an earth of this nature. However, all bodies, into whose composition calcarious earth enters, do not fall under the denomination of marle. To intitle them to this, they must fall into powder upon being exposed to the air. Hence, the purity of marles will be in proportion to the quantity of calcarious earth in their composition.

to them, from their different degrees of hardness, and the different dispositions of the beds into which they are extended. But, from what cause proceeds the diversity in the cohesive power of marles, equal in the proportions of their constituent parts, is difficult to say.

It appears from the experiments related in Sect. 3. that, in different marles, the proportion of the calcareous to the other earths is not laways the same. As this diversity may probably render a choice of marles for particular soils, if not necessary, at least beneficial, a more minute account, than that formerly given, of the process for discovering the proportion of earths contained in any marle, may not be improper.

HAVING dried and powdered the marle to be examined, pour, upon any given weight of it, a small quantity of water. To this mixture, well shaken, add a little of the acid of sea-salt,\* and when the consequent  
effervescence

\* ANY mineral acid may be employed with equal advantage,

effervescence is over, add a little more. Repeat this addition at proper intervals till no more effervescence ensues. Then throw the whole, with an equal or greater proportion of water, into a filter of grey paper, whose weight is known. When all the fluid parts have passed through, fill up the filter, again and again, with warm water. By this means, the dissolved particles of calcarious earth, adhering to the residue, or entangled in the pores of the paper, will be washed away, and nothing but what is really unsoluble will remain in the filter. This *residuum* with the filter must be compleatly dried and weighed. Then, the difference betwixt its weight, and

vantage, the vitriolic excepted. For, tho' this acid effervesces violently with all marles, it does not dissolve their calcarious earths; it only forms with them a whitish conglulum, which will not pass thro' the filter.

In any trials that I have hitherto made with the vegetable acid, I have not been able by its means to extract all the calcarious earth contained in any marle. For, after the usual filtration, the *residuum* always effervesced violently with the mineral acids.

and the original weight of the filter, gives you the weight of unfoluble parts contained in the marle under examination. This being known, the proportion of calcarious earth in the fame marle is evident. The proportions of clay and fand in it are difcovered by fubjecting the *refiduum* to a proper elutriation. This operation is very fimple, and performed thus: Having weighed the dry refidue, mix and fhake it well with a fufficient quantity of water. After allowing a little time for the fubfidence of the groffer parts, let the water, with the fineft particles of clay fufpended in it, be gently poured off. When this is done, add more water to the remainder, and after fufficient mixture and fubfidence, pour that off likewise. In the fame manner, repeat the operation again and again, till the water come over perfectly pure. The fubftance which then remains is fand, mixed, perhaps, with fome flakes of talc; and whatever this fubftance wants of the weight of the refidue employed, is the weight of pure clay  
carried

carried away by the water in the process of elutriation.

It may be here observed, that the effervescence ensuing upon the application of acids to marle, cannot be relied upon as a certain indication of the quantity of calcarious earth contained in such substances. Numerous instances of the truth of this assertion have occurred to me. For the effervescence varies, both in violence and duration, according to the strength of the acid employed; but it varies still more according to the penetrability and other more secret circumstances of the calcarious bodies.

## S E C T.    VI.

I next examined what effects fire would produce upon marle in its natural state. As many marles contain a very considerable proportion of calcarious earth, I expected that nearly the same changes would be produced upon them by calcination, as upon limestone.

EXPER.

## EXPER. XVII.

A piece of the marle of Experiment 3. weighing 80 grains, was kept in a strong fire for two hours. Its weight was thereby reduced to 52 grains, and its colour, from a blueish white, changed to a reddish brown. Its hardness was at the same time considerably augmented; and tho', when immersed in its natural state into water, it gradually relented and fell down into powder; yet now it neither suffered any change from that fluid, nor communicated to it any thing perceptible by the sight, taste, or smell. Notwithstanding this, when it was reduced to powder\*, it afforded, upon the affusion of water, as pungent lime-water as any quicklime could do.

## EXPER.

\* The pulverization of all burnt marles, that contain any considerable proportion of clay, is absolutely necessary to extract a lime-water from them. Inattention to this circumstance has, I believe, produced some mistakes. When shell-marle is burnt, pulverization is seldom requisite; because, this substance being naturally of a loose  
and

## E X P E R. XVIII.

THE marle of Experiment 6. by burning lost near a third of its weight, and acquired a very remarkable hardness. When put into the water in this state, it did not relent in the smallest degree, though naturally it dissolved readily in it. The laminated marle of Experiment 7. suffered precisely the same changes from burning.

## E X P E R. XIX.

THE marle of Experiment 8. when burnt and thrown into water, did not fall freely into powder, but loosened into pieces, which easily yielded to the pressure of the finger. This marle, before burning, dissolved very slowly in water.

EXPER.

and spongy texture, and acquiring little cohesion in the fire, allows the water an easy access to its calcareous earth.

## E X P E R. XX.

THE marles of Experiment 9. 10. 11. suffered, in their natural state, scarce any perceptible change from water; but, when sufficiently burnt, they swelled and fell down in water like lime-stone.

## E X P E R. XXI.

A drachm of shell-marle, Experiment 14. was by burning reduced to 42 grains, and then spontaneously yielded a strong lime-water.

FROM these Experiments, it appears, that the calcarious earth of marle is equally calcinable to quick-lime, whether it is exposed to the action of fire before or after its separation from the other earths.

IT is now sufficiently evident, that the nature of marle has \* a very intimate affi-

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\* By marles I mean such calcarious substances as are visibly reduced to powder by the influence of air and moi-

nity to that of lime-stone. A gentle gradation from the one to the other of these substances may be easily traced out; and it will be difficult, I believe, to establish the precise limits of either. Both of them are found in continued *strata*; both of them dissolve in part, with considerable effervescence, in acids; and both of them yield by calcination a quick-lime. In the foregoing Experiments, however, two very remarkable differences occur: By being exposed to the air, marle falls down into dust; lime-stone retains its original stability. On the contrary, after undergoing the action of fire, lime-stone is reduced to powder by the application of water; marle suffers no such change. This diversity cannot, with justice, be ascribed to the different proportions of calcarious earth in these two bodies. For the marle of Experiment 7. did not contain less of this than the lime-stone of experiment 12. ; and in the marles  
of

sture. Such only are real marles. Others, as those of Experiment 9. 10. 11. decline towards lime-stones;

of Experiment 3. 6. 7. the proportion of this earth was considerably greater than in the marles of Experiment 10. 11.; yet, after sufficient burning, the latter relented in water, the former not. Nay, when a part of a bed of stone, which contained only one third of calcarious earth, was calcined and put into water, it instantly fell down into powder; whereas marle, containing four fifths of calcarious earth, underwent no such change from the same treatment.

THE cause of the difference then must be sought for in the un溶uble part of these substances. Upon comparing the Experiments related in Sections 3. and 6. I observe, that all the *residua*, consisting of any considerable proportion of sand, were extracted from substances which, in a natural state, suffered very little change from water; tho', after calcination, water immediately reduced them to powder. On the contrary, the *residua* of clay were obtained from bodies possessed of just the opposite properties. That this observation will apply universally, I dare not venture

ture to affirm; but it appears to point out a probable solution of the present difficulty. To explain this in the most intelligible manner, it is necessary to observe, *1mo*, That dry clay suffers a very singular change from immersion in water. For its particles, then gradually receding from mutual contact, come at length entirely to lose their cohesive power; in consequence of which, the whole mass, after increasing in its volume, crumbles down into powder. *2do*, That clay, by the action of fire, not only acquires a considerable degree of hardness, but is at the same time so altered in its nature, that the water can no longer make any impression on it. *3tio*, That sand in its natural state suffers, from the influence of water, no change as to the cohesion of its particles; and that it acquires no considerable hardness in the fire. *4to*, That calcareous earth, when uncalcined, suffers as little change from water as sand does; but that, after calcination, it is affected in the same manner by that fluid, as clay is in its natural state. These things be-

ing premised, the difficulty is easily surmounted. Upon the exposing of marle to the air, the clay in its composition, moistened from time to time by the rain and dews, gradually moulders away; and in consequence of this, the cohesion of the whole mass is at last destroyed. On the other hand, when this marle is calcined, the increased cohesion of its clay locks in the calcarious particles, and, denying admission to the water, supports the mass against the action of this fluid\*. Limestone, on the contrary, and other substances consisting of calcarious earth, or calcarious earth and sand compacted into a solid mass, undergo no change from being exposed to the air; because none of their constituent parts have their cohesion

\* Stone-marles, upon being exposed to the air, divide first into masses of a considerable bulk. These divisions run for the most part horizontally or perpendicularly, with respect to the natural situation of the marle. Upon examining the divided surfaces, I find them covered with a thin coat of very fine clay, with little or no mixture of calcarious earth. Hence it is evident, why the resolution begins at the parts where this clay lies.

cohesion diminished by the influence of moisture. But, when these substances are calcined and thrown into water, as the calcarious particles then recede from mutual contact with a force which the cohesion of the particles of sand, if there is any, is not sufficient to resist, the whole composition must immediately fall into powder\*.

THUS

\* IT would appear, that in clay-marles, the particles of clay are disposed in such a manner, as to touch one another, and, at the same time, to prevent the mutual contact of the calcarious particles. According to this disposition, each particle of calcarious earth will be surrounded with a coat of clay. It is difficult to conceive how, without some such arrangement, the changes mentioned above should be produced. Unless the clay cements the calcarious earth, water, which only influences the clay, would scarcely bring about the resolution of marle; nor would the calcination of this substance, which transports the property of relenting in water from the clay to the calcarious earth, produce the effects ascribed to it above. Besides this, water, so far as is yet known, only destroys the attraction of the particles of clay to one another, not the attraction of those particles to any other substance; therefore, unless the particles of clay contained in any marle were in mutual

THUS it appears, that marles differ from other calcarious substances, only by containing a certain proportion of clay. On which account, the class of calcarious bodies will admit of a division into such substances as in the air fall down into powder, and such as do not.

## SECT.

tual contact, the application of water to that marle would produce no effect. On the other hand, when marle of considerable purity is calcined, if the calcarious particles were in contact with one another, not even the increased cohesion of the clay would be able to prevent their separation, considering the quantity of calcarious earth contained in such marles, and the force with which that earth, after calcination, explodes in water. But, if you conceive the calcarious particles as separately involved in clay, which in its natural state readily falls down in water, and after burning, denies admittance to that fluid, all the phenomena are easily accounted for. Besides all this, facts are not wanting to justify the supposition of this arrangement. Acids, however strong, cannot extract any calcarious earth from calcined marle, except such particles as lie upon the broken surface; and when these particles are thus carried away, the surrounding particles of clay, tho' more easily separated, still retain their former situation and attachments; which shows that such particles are fixed to one another, and can  
support

## S E C T. VII.

THE two following Experiments were made with a view to discover what change the action of fire produced upon the calcareous earth of marle, with regard to its solubility in acids.

## E X P E R.

support themselves in their place without any assistance from the calcareous earth. But, when water is applied to marle in its natural state, it gradually makes its way thro' the whole mass, which it reduces to powder. This, therefore, is a proof that the calcareous particles of marle have no mutual cohesion, since the whole mass moulders down as soon as the cohesion of the clay is destroyed. And, as no acid can find admittance deeper than the surface, to dissolve the calcareous earth in calcined marle, we may conclude, that taking out one particle of this earth does not open a passage to another; and therefore, that these particles lie in separate cells. From what is here said, we may plainly see the necessity of pulverization in Experiment 17. and 22. and likewise how it happens, that when the clay, mixed with a calcareous earth, is below a certain proportion, the composition, when burnt, cannot resist the influence of water. It may be here asked, how it happens, that acids can find admittance to the calcareous earth of marles, even

## EXPER. XXII.

THIRTY grains of the marle of Experiment 3. were, by burning, reduced to twenty. These, just taken from the  
 VOL. III. E fire,

in their natural state, as each particle is supposed to be surrounded by a coat of clay. As to this particular, it must be considered, that acids contain a considerable quantity of water, which acts upon the clay, at the same time that the acid is acting upon the calcarious earth. Hence it is, that the addition of water to the purer acids, facilitates the resolution of the marles to which they are applied. Besides this, in all pieces of marle, some particles of calcarious earth must be exposed. The acid, in dissolving these, sets at liberty their entangled air. This now restored to an elastic state, pushes every way with great force, breaks the shells of clay contiguous to it, and, by that means, exposes more of the calcarious particles to the contact of the acid. Thus the solution is carried on.

SOME of the foregoing reasoning may be applied in favour of the following supposition. It is probable, that in a compound consisting of calcarious earth and sand, the particles of the former surround and cement those of the latter. From this arrangement it is, that when such a composition is calcined, and put into water, the whole relents into powder, tho' only the calcarious earth is affected.

fire, and powdered, \* were mixed with a quantity of diluted acid of sea salt. No visible effervescence ensued upon the mixture; but a remarkable degree of heat was generated. When as much of the acid was added, as I judged necessary to dissolve all the calcarious earth contained in the marle, I filtered the mixture in the usual way. The residue weighed four grains, did not concrete by drying, and was considerably whiter than the residue of the marle in its natural state. The filtered liquor was of a yellowish hue, and upon the addition of an alkaline solution, precipitated

affected. In the same manner, when acids are applied to this calcined substance, they find no difficulty, even without a previous pulverization, and without the assistance of effervescence, to reduce the whole to powder; because they dissolve the cement.

\* The caution formerly given with regard to procuring lime-water from calcined marle, must also be observed in the application of acids to this body; for, without a previous pulverization, the experiment is generally unsuccessful.

precipitated 28 grains of a reddish powder.

### EXPER. XXIII.

TWENTY grains of shell marle, calcined in Experiment 21. generated, with the acid of sea salt, a considerable degree of heat, but without any effervescence. The un溶uble residue weighed thirteen grains, and the powder precipitated from the filtered liquor, eighteen.

Two circumstances, worthy of attention, occur in these experiments. The one is, the absence of effervescence during the solution of the calcareous earth; the other is, the remarkable difference betwixt the weight of substance carried off from the marles by the acid of sea-salt, and the weight of the powders afterwards precipitated from that acid.

BOTH these unusual appearances may be easily accounted for from Dr Black's ingenious experiments \*. As to the first, the

\* Edinb. Phys. Ess. vol. II. Art. 8.

the effervescence which ensues upon the application of acids to any calcarious substance in its natural state, proceeds solely from the expulsion of air contained in that substance. Calcarious earths are, by calcination, totally deprived of their air; therefore, those earths, in this state, never can excite any effervescence with acids. Hence the absence of any such commotion in the two foregoing experiments is easily explained.

As to the other circumstances, calcarious earths by calcination lose about a third of their weight. This loss is found to proceed from the expulsion of air and moisture naturally contained in such earths. Both this air and moisture, and consequently the original weight, are, according to Dr Black's observations\*, restored to such calcined substances by dissolving them in acids, and then precipitating them by an alkaline salt. As the marles employed in the foregoing experiments had undergone the action of

\* Treat. formerly cited.

of fire, their calcarious earth would necessarily be deprived of its natural proportion of air and moisture; on which account, the solution of this earth in the muriatic acid, and its subsequent precipitation, by restoring what was lost in the fire, could not fail considerably to increase its weight. And from thence it happens, that the weight of the precipitated powders, added to that of their respective residues, equalled pretty exactly the weight of the marles before calcination.

It may be also remarked, that the burnt marle of Experiment 22. yielded a smaller proportion of residue than the same marle in its natural state did. For, when this marle was examined as taken from the pit, its unsoluble parts were nearly a third of the whole; after undergoing the action of fire, they did not exceed a fifth\*. This difference, I imagine, is the effect

\* They did not amount to a seventh part of the weight which the marle had before it was put into the fire. For the weight of the marle then was 30 grains, the weight of the residue extracted after calcination was only four.

effect of iron contained in the present marle. Iron in ore discovers none of its metallic properties, and consequently is not then soluble in any of the acids\*.

But

\* From a late observation, I have some reason to doubt the truth of this assertion. Whilst I was examining some shell-marle, the following unusual appearances occurred to me during its effervescence with the muriatic acid: A pungent sulphureous vapour struck the nose; when the effervescence was at an end, the acid had acquired a peculiar disagreeable styptic taste, resembling the taste of the *tingtura martis*. Upon the addition of an alkaline salt to this liquor, when filtered, an okrey film rose to the surface, and a brown coloured powder fell to the bottom. Having re-dissolved part of this precipitated powder in the acid of sea salt, I added to the solution some drops of the tincture of galls. Instantly a deep black colour was produced by the mixture. The existence of iron in the marle under examination being thus demonstrated, I wanted to know what proportion of that metal was contained in this substance. For this purpose, having mixed 50 drops of the acid of sea salt with 120 drops of pure water, I dissolved in this mixture ten grains of the precipitated powder above mentioned; consequently 17 drops of this solution contained a grain of the powder. Into 12 ounces of water were put seven drops of this solution. In an equal quantity of the same water was dissolved  $\frac{1}{2}$  grain of pure salt of steel. To each of these were added 40 drops of

But when a body containing iron is calcined in contact with an inflammable substance, that metal immediately assumes its distinguishing qualities, and of consequence becomes obedient to the magnet, and soluble in acids. Therefore, when our marle, in its natural state, was examined by the acid of sea salt, the iron contained in it suffered no change, but remained in the filter as part of the residue. On the other hand, when this marle, surrounded on all sides by burning pit-coal, was properly calcined, its iron became soluble in acids, and consequently fit to pass thro' the filter, with the calcarious earth invisibly suspended in the acid of sea salt. Thus it is evident, that, in all marles containing iron,

the

a tincture of galls. The water which contained our solution became thereby considerably darker in its colour than the other. Therefore, ten grains of the precipitated powder contained more iron than  $14\frac{1}{2}$  grains of pure salt of steel. This marle communicated none of its iron to plain water. About a third part of its substance was soluble in the acid of sea salt.

the proportion of unſoluble parts muſt be diminifhed by calcination. A proof of the exiſtence of iron in the marle under conſideration, is its acquiring a reddiſh caſt in the fire \*, which all clays that contain iron are obſerved to do. That this iron remains with the reſidue, when the marle is analyſed in its natural ſtate, and paſſes off with the calcarious earth, when the analyſis is performed after the marle is calcined, is evident from ſome circumſtances in the foregoing experiments. For the calcarious earth, extracted from marle in its natural ſtate, was always white †; the reſidue by the action of fire became red ‡. On the other hand, the calcarious earth of calcined marle had a reddiſh appearance, the reſidue was white ||.

\* Experiment 17.

† Experiment 15.

‡ Experiment 4.

|| Experiment 22.

## S E C T. VIII.

ALL the foregoing Experiments were directed towards the resolution of marle. I next attempted an artificial composition of this substance.

## E X P E R. XXIV.

SEVEN parts of pure chalk were mixed, and, by the assistance of water, well kneaded with one part of tough clay. This paste, when dry, relented suddenly upon the application of water. Water also readily reduced it to powder, after a sufficient calcination. From this, and Experiments 9. and 20. it appears, that all proportions of clay and calcarious earth compounded together, will not resist the influence of water applied to them after calcination.

## EXPER. XXV.

FOUR parts of chalk were properly kneaded with one part of clay, and dried. This mixture, when calcined and put into water, suffered no perceptible change. The event was the same, whatever proportion of clay was used; provided this was not less than the proportion employed in the last composition.

## EXPER. XXVI.

FOUR parts of chalk, one part of sand, and one of clay, were well kneaded together, and dried. When this mixture was put into water after calcination, it cracked in several places, but did not fall down into powder. From this we see, that the addition of a little sand to the proportions used in the last Experiment, makes a composition unable, when sufficiently burned, to resist the influence of water. And this happens, because such an addition augments the surfaces

to

to be connected farther than the clay can be properly extended. For this reason it is, that a greater proportion of sand than what is employed in this Experiment, gives a composition, which the action of fire renders unable to resist water in the smallest degree. Compare Experiments 7. and 8. with Experiments 18. and 19.

#### EXPER. XXVII.

Six parts of chalk, two parts of sand, and one part of clay, gave a composition, which, when calcined and put into water, immediately fell down into powder. I have seen a lime-stone consisting of the same proportion of earths.

It may be remarked, that tho' the last composition, and that of Experiment 24. quickly relented in water, after calcination; yet many little masses in both suffered no change. This was probably owing to some inequalities in the mixture, by which the particles of clay were

were in some places allowed to remain in contact with one another.

### EXPER. XXVIII.

EQUAL parts of quick-lime\* and sand were kneaded together and dried. In this state, the mass suffered no change from water; but, when properly burnt, it exploded in water with considerable violence.

### EXPER. XXIX.

A piece of old mortar, after calcination, fell down immediately in water. This mortar, examined by the acid of sea-salt, appeared to consist of calcarious earth and sand, in equal proportions †.

THUS

\* I could by no means make crude calcarious earth cohere with sand in such a manner as to resist either the slightest touch, or the influence of water.

† In the same manner, the proportion of sand in any mortar may be easily examined; and consequently, the composition of such mortars, as have, for many ages, withstood the effects of time, may be thus discovered.

THUS it is manifest, that calcarious earth and clay constitute a substance possessed of the properties of marle; and that a mixture of the same earth and sand, even in equal proportions, is not destitute of the most distinguishing characters of limestone. These circumstances serve to support the account formerly given of the natural composition of marle and limestone, whilst at the same time they show, that marles, considered as calcarious bodies, may surpass many lime-stones in purity. Marles, however, are limited in the proportion of their calcarious earth. They cannot, according to my observations, contain much above four-fifths of it. Lime-stone may consist entirely of this earth.

FROM the affinity betwixt marles and limestone, we may see whence it happens, that a bed of the latter is often found interposed betwixt two beds of the former. The calcarious earth in both is the same. The subsidence of clay in the one case, and sand or nothing in the other, along with that earth, makes all the difference.

Among

Among beds of marle, a bed of coarse stone sometimes occurs. This stone, however, I have generally found to contain a considerable proportion of calcarious earth; but the quantity of this earth was too small to procure the stone the denomination of lime-stone; and the quantity of clay in it was not sufficient to intitle it to a place among marles.

## S E C T. IX.

HAVING in this manner analysed marle as newly dug from the ground, I next proceed to examine this substance after its exposition to the air. The Experiments 3. 4. 15. 16. 17. were repeated upon marles that had been exposed for many months. The events were the same, as when the experiments were made upon newly dug marle; nay, part of a *stratum* of stone-marle, after it had been exposed for three years to the open air, and had undergone all the visible changes that usually proceed from such an exposition,

fition,

fition, discovered the same proportions of calcareous earth and clay, as when it was taken from the pit.

MARLE, when used as a manure, being generally supposed to attract from the air a certain acid spirit, with which it combines into a neutral salt, the powerful promoter of vegetation; I shall here add an account of two Experiments, made with a view to ascertain the existence of that salt.

#### E X P E R. XXX.

Two drachms of clay-marle, which had been exposed to the air for six months, were digested, with a considerable heat, in ten ounces of water. This water, after 24 hours, was filtered off, and the same quantity again added. After the same space, this second water was also filtered off. The marle being then dried, wanted a grain of its original weight. None of the filtered waters suffered any change from the addition of an alkaline salt. Both of them were, by a gradual evaporation,

ration, reduced to the quantity of an ounce. This differed in no visible manner from the waters before evaporation, except that, after standing a little time, it deposited a small quantity of a grayish insipid earth, which, after a very brisk effervescence, dissolved intirely in the acid of nitre. Nothing but such an earth remained, when the evaporation was pushed to dryness.

## E X P E R . XXXI.

Two drachms of shell-marle, which for three years had been exposed to the open air, were treated precisely in the manner described in the foregoing Experiment, and in every respect with the same appearances. The marle, after digestion, wanted half a grain of its original weight. The filtered waters suffered no change from the alkaline solution, and left, upon evaporation, a small quantity of calcarious earth.

THESE two Experiments seem to contradict the common opinion with regard to  
the

the operation of marle in agriculture; for the marles here employed had certainly been exposed as long as might have been sufficient for the attraction of a considerable portion of the aerial acid, and the consequent formation of a sensible quantity of a neutral salt. But these marles evidently contained nothing of a saline nature. For, by digestion in water, the proper *menstruum* of every salt, they suffered in weight no diminution of any consequence. The grain wanting in Experiment 30. and the half grain in Experiment 31. may be safely allowed as the consequence of loss of substance, which no attention can prevent in the process of such experiments. But, supposing this diminution of weight really to proceed from the solution of some saline substance, such an inconsiderable quantity of salt will by no means account for the effects produced by marle; therefore these effects must proceed from some other cause.

THE filtered waters left, upon their evaporation, a substance which did not in

the smallest degree partake of the nature of salt. Besides this, an alkaline solution added to these waters produced upon them no visible alteration; which would not have been the case, if they had extracted any thing of a saline nature from the marles. For, as marle contains no alkaline salt \*, the calcareous earth alone of this substance could serve as a basis for the formation of a neutral salt; and it is well known, that all such neutral salts are, after solution in water, immediately decomposed by the addition of an alkaline salt, which never fails to throw the earth to the bottom in form of a white powder. Therefore, if our waters had extracted any salt from the marles with which they were digested, the alkaline solution would infallibly have discovered it †.

IT

\* Experiment 1. 2.

† Having dissolved 27 grains of pure chalk in a drachm of the nitrous acid, and mixed the solution with five drachms

IT may be objected, that the heat employed in the foregoing experiments was too inconsiderable to promote the solution of the salt contained in the marles under examination. But, to obviate this objection, it must be considered, that the heat, in which these experiments were made, greatly exceeded any heat to which the soil in our climate is ever exposed. From whence it is evident, that whatever proportion of salt our marles may acquire from the air, this salt never can contribute by its solubility to vegetation; and consequently marles cannot act in the manner that is generally supposed. Besides, to remove all doubt with regard to this point, I boiled in water, during an hour, two drachms of the marle of Experiment 30. This marle, when afterwards separated by filtration and

drachms of water, I found, that one drop of this mixture could, by the alkaline solution, be discovered in two ounces of soft water. But no more than a sixth part of that drop, at the utmost, can be considered as salt; therefore, one drop, equal in weight to a grain of pure salt, will be discoverable in twelve ounces of water.

and dried, weighed two drachms and a grain. The filtered water suffered no change from the alkaline solution. This experiment was repeated with the same appearances upon the shell marle of Experiment 31. Hence it is manifest, that our marles, by exposition to the air, had acquired nothing of a saline nature.

IN Experiments 30. 31. it is mentioned, that the digested waters left, upon their evaporation, a small quantity of real calcareous earth. Lest this earth should be suspected to proceed from some marley salt decomposed in the progress of the evaporation, it must be observed, that the pure fountain water employed in these experiments, deposited, by the same treatment, a quantity of calcareous earth equal to what was afforded by the digested waters; and, from this circumstance, we may perceive, whence proceeded the increase in the weight of the marle which had been subjected to so long boiling.

UPON the surface of some marley rocks which looked towards the north,  
and

and had been exposed time immemorial to the open air, I found a thin white efflorescence. In many places, where water trickled down from the rocks above, moss, to the thickness of some inches, had been in time accumulated, and was now crufted over with a hard white substance. Below this cruft, the different plants of moss were found disposed in a very regular manner, and foldered together by a substance similar to the cruft. Here I expected to have found the salt of marle; but could not, by any treatment, discover the smallest indication of it. The mineral acids, after a very brisk effervescence, dissolved entirely both the effervescence from the surface of the rock, and the matter which adhered to the mass. From this circumstance it appears, that these substances consisted solely of the calcarious earth of the marle, freed from the other earths, by the moisture, &c. whose action it had for many years undergone.

THESE marles were exposed alone to the air. Whether, when incorporated  
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with the soil, such substances may be more readily converted, in their calcareous part, into salt proper for the nutrition of vegetables, experiment alone can determine. Some circumstances in the manufacture of nitre seem to persuade us that they may. On the contrary, observations are not wanting which appear to take greatly from the probability of such an opinion; for marles are found to produce the most remarkable effects on light exhausted soils, where they can find little or nothing proper for furthering the nitrous process, or the production of any salt we are yet acquainted with. However that may be, I think we are authorised by the foregoing experiments to assert, that marle acquires nothing of a saline nature by being exposed alone to the open air\*.

IF no salt is formed upon marle from  
its

\* THE following observation, however, must not be concealed. Upon a *stratum* of marle, which, with others, had been exposed for ages to the open air, I  
found

its exposition to the air, How does marle operate? An answer to this question would necessarily lead us to consider the operation of manures in general; a subject too extensive and intricate to be discussed within the narrow limits of this essay; therefore I shall delay any further inquiry into the action of marle to a more convenient opportunity. In the mean time, consider, "Quod in omnibus rebus, et maxime physicis, quid non fit, citius quam quid fit, dixerim". CICERO DE NAT. DEOR.

found a whitish saline efflorescence in considerable quantity. This efflorescence was moist, and dissolved readily in water. An alkaline salt added to a solution of it immediately precipitated a calcareous earth. After separating this earth by filtration, the remaining liquor afforded, by a proper evaporation, many distinct crystals of a cubical figure. They tasted like sea-salt, crackled in the fire, and, by the addition of the vitriolic acid, emitted copious suffocating fumes. Hence it appears, that the salt found upon this marle consisted of the muriatic acid united to calcareous earth. It is singular that no vestige of this salt appeared upon any of the beds of marle but one, and this one had nothing peculiar either in its composition or situation. It differed from the rest in this only, it was possessed of a greater degree of moisture.

## ART. II.

*The Advantages of Shallow Ploughing, by*  
MR GEORGE CLARK \*.

**I**T is some years since I first learned from gentlemen of observation, that the farmers in Norfolk, and the neighbouring counties, ploughed very shallow, and, notwithstanding, raised good crops, and were esteemed good husbandmen.

SOME are convinced from what they hear or read; nothing will make impression upon others but ocular demonstration; and, for my part, I am of the last class, an unbeliever, that could not see the weight of the arguments advanced in support of the practice, till I had an opportunity of travelling through that part of the kingdom, and observing the management of the gentlemen and farmers, which of late has raised the coun-  
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\* Read Feb. 1761.

ty of Norfolk in particular, from a state of poverty to that of plenty and great affluence.

THAT the import of the following observations may have the desired effect, it will be necessary to give a short account of the nature of the soils where the practice is followed.

IT was in Lincolnshire where it first drew my attention, and induced me to measure how deep they went with the plough; which I found, after many accurate trials, seldom exceeded two and a half, and never, that I remember, three inches.

THE high lands of this county consist commonly of a light sandy soil, that seems to be formed by the air and rains breaking and crumbling down a bastard limestone, that lies in most places only a few inches under the grass, dipping and rising according to the depressions or elevations of the county, but in general hanging to the east. Little or no water remains here on the surface; for the stone being open, it sinks as it falls from the

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heavens, and never appears again till it comes to the level of the marshes, or fen-country, where the soil may be said to have no bottom, at least it is deeper than can be reached by any method of culture.

THE high grounds are for the most part common, or employed in pasture for sheep. The low or fen countries have now and then also very extensive commons; but the rest of the country is well divided and inclosed, the soil rich, and producing, when in tillage, weighty crops of hemp, flax, turnip, barley, grass-seeds, wheat, oats, and, when laid down, the best pasture for cattle of all kinds.

WHAT may properly be called the high grounds of Norfolk, are generally covered with a very thin light soil; the low lands are of the same quality, but the soil deep, occasioned by washing or blowing from the higher parts.

THE brooks and rivers run in extensive marshes, made by the springs breaking  
ing

ing out on their sides; for, as the whole country seems to lie upon one lump or mass of grey chalk, which they call marle, the superficial water sinks quickly, and, as was observed before in Lincolnshire, does not appear again till it reaches the level of the marshes; and it may be taken for almost for an universal rule, that, under any extent of country where the water sinks in this way, the greatest part of the *strata* will be found calcareous or limestone.

DERBYSHIRE produces many instances of this.

THE number of chalk or marle pits, every where opened up in Norfolk, give great opportunities of seeing the nature of the *strata* that lie nearest the surface.

THE staple is generally of the light soil above mentioned, then a brown oker-coloured sand, mixed with pieces of flint, very dead in its nature, and seems to contain not the least principle of vegetation, but is, in my opinion, a certain sign that the chalk is at no great distance; and it is common to observe deep holes in the  
chalk,

chalk, which is otherways very solid, filled with this sand. They have also clay-lands; and, when any considerable quantity of chalk is mixed with it, they give it the name of clay-marle, and esteem it the best for the improvement of light land.

WHAT they call *cragg*, is no other than banks of sea shells, though they are now and then found at a considerable distance from the present shore; it is a very valuable manure, and highly esteemed.

IT would spend too much of the Society's time, to mention the nature of the soils in the neighbouring counties, where the same practice is followed, and where they have also very stiff clays, all ploughed in the same way, never going above three inches deep, and seldom above two and a half, whatever be the soil or intended crop.

THE reasons that the farmers and gentlemen give, are,

THAT land turned up with a shallow furrow will produce an equal or better crop than when ploughed deep, even though

though the foil should allow them to go down any length; for that, by ploughing deep, they would turn down, and hide from the influence of the weather, the surface and best part of the foil, enriched with the roots of plants, &c.

THAT, by repeated experiments, they found, that ten cart load of dung or marle will go as far in improving an acre of land, when only ploughed three inches, as twenty would do of the same manure, if they ploughed six inches; and so in proportion; and that, by the same rule, manure may be carried to advantage double or triple the distance.

THAT as the work is lighter, fewer cattle and servants are necessary to carry on their husbandry.

THAT land ploughed shallow is much easier cleaned of weeds, as their roots are with less trouble exposed to the sun and wind, and the seeds of annuals brought nearer the surface, and by that means encouraged to vegetate, which is necessary before they can be rooted out and destroyed.

SHOULD

SHOULD their marle or manure go down, it is easier brought up than when sunk in a deeper furrow, where the air and weather can have little or no influence.

IF ground is stoney, it will be cleared with less or more trouble in proportion to the deepness the plough runs.

THAT shallow ploughing will bring always the earliest crops, which are found, at least in all cold countries, to be the best.

THAT the farmers in Norfolk are in a better channel of improvement than their forefathers, none will doubt who knows how much the rents and wealth of that county are increased. But some may alledge, that, if they ploughed deeper, the improvement would be greater. I doubt greatly of this, when I compare the soil and rent paid by them with the soil and rent paid in other parts of England; for in Norfolk there are large tracts of land for which the farmer pays to the landlord twenty shillings *per* statute-acre; and when this

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is the case by agreement and common custom, the tithe is five shillings, and the poor rates three shillings, or three shillings and six-pence, all paid by the tenant. The statute-acre being as four to five of ours, a fourth part of the above sums must be added to the accompt; which will then stand thus, when reduced to our measure.

To the master	L.	1	0	0
To the church		0	5	0
To poor rates		0	3	6
To allowance for the difference of the statute English acre from ours		0	7	0
			<hr/>	
Total	L.	1	15	6

It is true, that several of the old leases, granted when they first began to improve, still continue in force, and that by these the farmers are only obliged to pay from seven to eight shillings per acre, and the tithes and poor rates in proportion: But it is as certain, when any  
of

these leafes fall, the grounds are never let under double the old rent, and moſt frequently at the rate above mentioned.

THEIR wheat and oats are good, their barley is eſteemed the beſt, and their crops of turnips are heavier than in any other part of England. Some roots arriving, by the common culture of the county, namely the hand-hoe, at a ſize greatly ſurpaſſing any thing we yet know of, though raiſed in the horſe-hoeing way.

I humbly apprehend, arguments, from what we obſerve of land lying in a natural ſtate, may be even brought to ſupport the practice: But this paper being drawn out already to too great a length, I ſhall only here remark,

THAT where lime ſtone or chalk comes near the ſurface, there the effects of it are ſeen upon all roots, plants, and trees, but when it lies only a few inches under the ſurface, perhaps not above eight or nine inches under the graſs, and in a horizontal poſition, from which there is no waſhing, then it appears not to do the leaſt good to what is above it, but  
lies

lies dead till exposed by some accident to the more immediate influence of the weather.

THE flat moors in Yorkshire produce many striking examples of this; for, where on a level, they are covered with nothing but heath; but on the sides of declivities, where the lime-stone beds break out to the day, there the sward is green, and covered with the best kinds of grass, the water that runs over and washes the lime-stone, impregnating all below, till it meets with an opportunity of sinking; then the heath again takes place, till a new bed breaks out; and it is most remarkable, that all kinds of cattle will feed fat in two thirds of the time upon what is called a lime-stone bottom, that they will do upon any other unlimed land; the same effect may be produced by bringing a sufficient coat of lime upon the surface of the heath or grass.

WHEN we enrich old grass by dunging, the dung does not go down any considerable length, but will be found,

for many years after, remaining on the surface, at least, the earthy part of it.

THAT if trees are planted too deep at first, they make no progress till the roots rise, and run alongst the surface. Even old trees do not push their roots downwards; and though the weight of the trees depress that part of them which join the trunks, yet these, when at such a distance as not to be influenced by the incumbent weight of the tree, rise to the top.

SOME experiments are now trying, to determine, whether the same practice of shallow ploughing will answer here as it does in Norfolk, and other places of the world. For though I have had no opportunities of seeing their method, yet there is reason to believe it answers in many of the southern climates, where, from the accounts given of the nature and number of cattle they employ in working a plough, it is impossible to suppose they go deep; and  
if

if it is found to answer in these countries, where the heats are frequently too great, ought it not to be attended with great success here, where the sun has much less influence, and where our crops are frequently lost for want of warmth to bring them to maturity?

A R T.

## A R T. III.

*Observations upon the foregoing Paper concerning Shallow Ploughing, by LORD KAMES\*.*

**H**OWEVER much shallow ploughing may have prevailed in particular spots, or even in a whole county, one will be apt to suspect that it is owing to necessity or indolence, especially as the opposite practice is every where adopted in theory. At the same time, every man of science must be acquainted with many favourite topics, that, after a long establishment, have been overturned by the most satisfactory experiments. And among the numerous maxims in art, as well as in science, that at present pass current, it is probable that they would not all of them stand the test of accurate and bold inquiries.

For

\* Read 1761.

For that reason, I gladly pay my tribute of praise to the author of this paper, for his freedom of inquiry; tho' I am not convinced either by his authorities or reasonings, that, in general, shallow ploughing is best; that is, where the plough is kept within three inches of the surface.

A practice established upon sensible principles ought to be much regarded; not where it is derived from ignorance, chance, or prejudice. Husbandry is yet in its infancy, and the bulk of its practice hitherto is, I am afraid, derived from one or other of the sources now mentioned. Practice, therefore, ought not to have great weight in husbandry; and, were it to have weight, it would lie against shallow ploughing; for in Britain, at least, I presume, that deeper ploughing prevails. And if we were blindly to follow authority without reasoning, I should certainly embrace deep ploughing, which, as it is attended with additional expence and trouble, could not readily

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ly have become general, but from the experience of greater profit.

AT the same time, there are particular circumstances in which shallow ploughing is best; and if these circumstances occur in the examples given, the practice is so far good, without having the least weight in the general point. The first example of shallow ploughing, is in the fens of Lincolnshire, where the ground is tender and moist. In a soil of that kind, the roots of plants, to avoid a superfluity of moisture, cannot be kept too near the surface; and to this end shallow ploughing certainly contributes.

THE next example is Norfolk, the surface of which is described to be a thin light soil, covering an oker-coloured sand, dead in its nature, and unfit for vegetation. Shallow ploughing here is a matter of necessity, and not of choice; for one cannot with too much care avoid such a bottom. The third instance, indeed, of ploughing shallow in stiff clay, would deserve the greatest regard, were it vouched to be the result of rational experiments,

experiments, after many comparative trials; but, for aught we know, it may be the result of imitation only. In the neighbourhood, shallow ploughing is proper; and the example is perhaps blindly followed, without attending to the difference of circumstances.

DROPPING then authority and practice, from which so little satisfaction can be obtained, the only resource left us is, to recur to principles and rational considerations; which, at the same time, I am afraid, will not carry us far; as several articles are necessary to be established by experiments before a conclusive argument can be formed. One capital article is, At what depth from the surface roots produce their strongest effects? Concerning this article, there is nothing ascertained with any degree of accuracy, further than in general, that some roots pierce deeper than others, and that many roots, even of corns, produce vigorous effects much lower down than three inches. Were arguments *a priori* to be trusted, independent of experiments, one would believe,

believe, that roots are always in the most advantageous situation where nature places them; and that, accordingly, a plant thrives best with downward roots, where nature gives them that direction. If this proposition hold, to which we may trust till the contrary be demonstrated by experiments, it follows, that shallow ploughing is proper for those plants only which extend their roots horizontally.

BUT as, beside lateral or horizontal roots, the bulk of vegetables push many roots downward much deeper than three inches, the benefit of deep ploughing for these plants will appear from the following considerations.

IN the *first* place, it gives room for the roots to extend themselves according to the direction of nature, which, it is presumed, will contribute to the vigor of the plant. This argument goes upon the supposition, that the soil, as far as pierced by the plough, is proper for vegetation, either naturally, or made so by culture; and it must be kept in view, that every

every inch of the staple comes in succession to be at the surface, and gets the benefit of the sun and frost.

*Secondly*, By deep ploughing, the staple is doubled or tripled. I do not say that this doubles or triples the fertility of the soil; because I imagine, that a plant receives the greatest proportion of its nourishment from the roots nearest the surface. But, as I have little doubt that some nourishment proceeds from the deepest roots, I conjecture, that, all other circumstances being equal, the fertility of the soil bears a proportion to the deepness of the staple.

*Thirdly*, I lay great weight upon the following considerations: I am greatly inclined to a theory that of late years is creeping into reputation, *viz.* That moisture is the *pabulum* of plants: That the earth serves no other purpose but to be a receptacle for moisture; and that the richest soil is that which furnisheth a due proportion of moisture to its plants. Now, let us compare a shallow and a deep staple with respect to moisture. Where the

staple is shallow, the roots, which cannot pierce the hard ground below, must spread along its surface. In that position, they are drenched in water upon every severe shower; and this moisture lies so near the surface, that it is immediately sucked up in time of drought, and vanishes by evaporation. Thus it is, that the excesses of drought and of moisture alternately are the consequences of a shallow staple. A deep staple possesses the opposite advantages. The moisture lodges below the bulk of the roots, and becomes a reservoir, which supplies moisture to the roots above, even during a pretty long drought.

*Fourthly,* In this country, I doubt whether, by shallow ploughing, winter-grain can be sufficiently covered to prevent the piercing frost. The seed ought not to be laid at the bottom of the staple; because the hard ground below is very improper to receive the tender roots. And if it be laid any way near the center of the staple, the earth above will  
not

not be sufficient to give it a good covering.

*Fifthly*, WE know by experience, that couch-grass, thistles, and many other hardy weeds, root themselves in the ground much deeper than three inches. These are not to be eradicated but by deep ploughing; and deep ploughing, once begun, must be continued; for the under staple left deserted is soon filled with weeds, which will destroy what is sown above them.

THE reasons given by those who practice shallow ploughing, weigh not much with me. The *first* is, That the surface-soil, enriched with dung and roots of plants, which is by far the best, will, by deep ploughing, be buried, and a soil worse in quality be brought to the surface. This inconvenience, I grant, will follow, the first time the ground is ploughed deep; but then this is but a temporary inconvenience, and will soon vanish, to give place to a solid improvement. The rich surface-soil will not suffer by being laid at the bottom. But the bottom-soil brought

brought to the surface will soon be enriched by dung and by the influence of the sun and frost. The staple being thus enriched throughout, the turning over the soil will not thereafter have any bad effect; nay, it will have a good effect, by employing soil that has in some measure been long rested.

THE *second* reason concerns manure; it being urged, that ten load of dung will go as far in improving an acre, having three inches of staple, as twenty will do where the staple is six inches. I acknowledge, that it will improve three inches; but I deny, that the acre will be equally improved with ten as with twenty load, till it be proved against me, that three inches of staple are as good as six, which is the very question that is in dispute.

I admit the *third* and *sixth* reasons to be good, as far as they go. A shallow staple is frugal, not only in the first formation, by saving labour in clearing it of stones, but also by saving labour in ploughing. But it remains to be determined, whether that circumstance be  
sufficient

sufficient to overbalance the advantages of a deep staple.

As to the *fourth* reason, I deny that weeds can be best cleared by shallow ploughing. On the contrary, as above hinted, I do not find it practicable to clear the ground of weeds without deep ploughing.

As to the *fifth*: Manure that falls to the bottom, is no doubt easiest brought up where the staple is shallow. But that very supposition, if it hold in fact, must necessarily introduce deep ploughing. For manure that hath subsided to the bottom of the staple cannot be brought up without going under it, and entering upon the hard ground below; and this operation two or three times renewed must produce deep ploughing.

THE reason *last* urged is, That shallow ploughing brings an early crop. One thing I know, that the weakest crop is always the earliest. If shallow ploughing bring both an early and plentiful crop, this must be acknowledged a great property. But I must take the liberty to

to doubt of the fact, till it be ascertained by regular experiments. With respect to winter-crops, the probability lies the other way. When seed is laid deep, supposing always that it is not buried, it has a warm bed, and is the better protected from frost. This ought to contribute to an early harvest as well as to a plentiful one. Another consideration concurs: Wheat is a tall crop, and is apt to wind-wave where the roots are not laid deep in the ground; and this must retard its growth. Barley, I acknowledge, is the better for being laid near the surface, where dews and the heat of the air may easily penetrate. Its growth is also at that season of the year which is the least infested with winds.

UPON the whole, tho' I lean to deep ploughing, I am far from being rivetted in my opinion. We can trust little to experience, and the foregoing reasonings are too slight to afford solid conviction. Here then is a fair field opened for rational experiments; to promote which, the Society will esteem it their greatest honour.

honour: And they certainly will be well pleased to find experiments upon this head promised by one of their own members in the paper which has given occasion to the present observations. Experiments cannot fail to succeed under the direction of a man whose accuracy is not inferior to his knowledge.

ART.

## ART. IV.

*On Evaporation, by the same.*

OF the various natural operations known to us, not one appears in itself more wonderful, nor in its effects more salutary and extensive, than the circulation of moisture. What can be more wonderful, than to find such a mass of water suspended in air, a body eight hundred times lighter than water! And what effects, proceeding from any one cause, are more salutary and extensive, than the descent of this water in rain, dew, snow, &c. forming springs and rivers, and impregnating the earth with moisture, to produce food for plants and animals?

To account for this extraordinary phenomenon, having been attempted by many philosophers, the purpose of the present

sent short essay, is to take a view of the causes assigned, and to examine whether any of them can be relied on as the true cause.

THE first I shall mention is that given by Doctor Halley. He imagines that a bubble, composed of a particle of air inclosed within a film of water, is rarified by heat to the degree of being specifically lighter than common air; and that such particles, whatever be their number, must ascend and be suspended in the air. This theory is liable to many objections; some of which appear unsurmountable. A great quantity of air, it is true, is found dispersed in water; but by what means a bubble should be formed distinct from the mass of water, seems not obvious; and ought not to be taken for granted, till it be ascertained by good proof. But, supposing the existence of such bubbles, they will not advance the Doctor a single step; for it still remains to be explained by what means these bubbles ascend into the air. Gravity is evidently an insufficient cause; for, if it cannot force

upward pure air lodged in the water, what ground have we to suppose that it can force upward air inclosed within a watery film?

IN the next place, supposing these bubbles to be raised to the surface of the water, I cannot find a cause for their rising higher. The air in the bubble is indeed supposed to be rarified by heat; but must not the circumambient air be also rarified by the same heat?

IN the third place, supposing the bubble fairly lodged in the atmosphere, in spite of all these difficulties, the power of gravity will never account for its continuing there: It must instantaneously be condensed, so as to be in *aequilibrio* with the surrounding air, leaving the film of water to descend by its gravity, till it settle in its own element. Let me not be misunderstood in this argument, which is not intended to contradict a notorious fact, that water may continue long suspended in air, but only to evince, that gravity cannot be the cause of that phenomenon.

IT will occur at the same time, that the foregoing account of evaporation is  
contradicted

contradicted by many noted experiments. Mr Gauteron of the French Academy has made it appear, that fluids lose more by evaporation in severe frost than in moist and warm air: Therefore evaporation cannot depend, solely at least, upon gravity, even though assisted by heat.

FROM various experiments, we have reason to believe, that evaporation depends in some measure upon heat. This fact probably has suggested the foregoing theory, accounting for evaporation by the rarefaction of air; and it is still more probable, that it has also suggested the following theory, accounting for it by the rarefaction of water. Doctor Desagulier, whose theory it is, reasons thus: Water is expanded by heat; and supposing it to be expanded to a bulk more than 800 times greater than in its usual state, it becomes specifically lighter than ordinary air, and must consequently rise in it till it meet with air above of its own degree of rarefaction. To illustrate this theory, he observes, that boiling water,  
when

when it becomes vapour, is expanded to a bulk 14,000 times greater than when cold; and to account for evaporation in the ordinary heat of our atmosphere, he takes for granted a doubtful proposition, *viz.* that the degree of expansion is strictly proportioned to the degree of heat; from which proposition he calculates as follows: In Sir Isaac Newton's scale of heat, the heat of boiling water is 34, the mean heat of Summer is 5, the mean heat of Spring and Autumn 3, and the mean heat of Winter 2. Therefore, if the expansion of water by 34 degrees of heat be 14,000, the expansion by 5 degrees will 2,058, by 3 degrees 1,235, and by 2, being the mean heat of winter, 823, which is sufficient to raise water, the density of which, in its ordinary state, is to that of air as 800 to one.

BUT, with the Doctor's leave, here is a calculation not a little absurd; for if, even by winter-heat, water be so expanded as to be specifically lighter than air, by what restraining power does it remain below, contrary to the power of gravity?

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The solid answer to this difficulty is, That the heat, great or little, which expands water, must have the like effect upon air, so as to preserve their specific gravities in the ordinary proportion of 800 to one. But the Doctor dares not make this answer; because it would show his theory to be absolutely chimerical. I put another question, which is, That if, even in winter, water be so expanded as to be lighter than air, in what season of the year is water so dense as to be 800 times heavier than air? This fact the Doctor sets out with as the foundation of his calculation; and is it not strange, that he should so far forget himself as to draw a conclusion flatly contradictory to his premises?

BUT now, supposing water in a state of expansion to be fairly lodged in the air by the power of gravity, the Doctor has forgot to say by what means it is kept there suspended. He ought to have seen, that, however expanded below, the water mixed with the superior air must in a trice be restored to its usual degree  
of

of condensation ; and consequently fall down with celerity by its weight so greatly superior to that of air.

THERE has perhaps been too much said upon theories, that in every view are insufficient. But, in attempting to account for evaporation, it seemed of consequence to show clearly the necessity of recurring to some other cause than gravity, whether acting upon air or water. And, in searching for the true cause, a reflection occurs that promises some discovery ; which is, that writers upon this subject have overlooked one of its capital branches : They have endeavoured to explain why water, contrary to gravity, continues suspended in air ; but they have never thought of examining why air, not less contrary to gravity, is kept down in water. The latter fact is not less remarkable than the former ; for, with respect to timber, and other bodies without number, heavier than air, and lighter than water, we find gravity producing its usual effect of raising such bodies to the surface of the water. This clearly evinces,

evinces, that the detention of air in water must be owing to some cause overcoming the power of gravity.

As we never find, in a natural state, water without a mixture of air, nor air without a mixture of water, do not these facts fairly authorise us to maintain, that air and water have a mutual tendency to union; or, in other words, that there is an elective attraction between them? Why air is diffused in water contrary to the power of gravity, remains to this day a question. Heat and gravity fail us here altogether, leaving no cause that is so much as plausible, besides the elective attraction mentioned. We have little reason to doubt of this cause, when we find timber, cork, earth, sand, and numberless other bodies, go either to the surface of the water or to the bottom, according to their specific gravities. And, if these facts evince that water attracts air, and not the other bodies mentioned, the same reason evinces, that air also must attract water, when we find water suspended in air, and detained in that  
situation

situation contrary to the power of gravity.

WE have the more reason to acquiesce in this theory, considering that elective attraction is not invented to account for a singular phenomenon, but is the great principle upon which all the operations in chemistry depend. Mercury attracts sulphur, as appears from the composition of Ethiop's mineral and cinnabar. Iron and copper attract salt out of the air, and, being dissolved by it, are converted into rust. Alcaline salt is a strong attractive of the watery particles with which the air is impregnated. Bricks newly burnt, attract water with noise and violence. Fuller's earth, by attracting oil and not wool, serves to purge woollen cloth from oil. For what other reason doth a sponge hold water, but their mutual attraction? One would expect the contrary effect from the porosity of a sponge. In fine, the manifold precipitations performed in chemistry may fairly be accounted for by that principle. And why not also admit an elective attraction between

between air and water, when every effect corresponds to that theory?

THE true theory of the circulation of moisture, considered in its different branches, appears to be what follows: 1st, By an elective attraction between air and water, there is always found a quantity of air in water, and a quantity of of water in air; 2d, When water is saturated with air, it attracts no more; and when air is saturated with water, it attracts no more; 3d, Heat is found to augment the power of elective attraction; for, after air is saturated with water, or water with air, they will attract more by increasing their heat; 4th, The air with its moisture being rarified by heat, ascends to a higher region, leaving place below for purer air not yet saturated, which accordingly attracts more moisture; and water by that means is diffused through the air; 5th, The grosser particles of water swimming in the air, being accumulated by wind, especially contrary winds, become visible clouds, and fall down in rain by the force of gravity overcoming the elective attraction; 6th,

Cold also contributes its part, by condensing the watery particles, which fall down in snow when the cold is violent; and, by these means, a constant circulation of moisture is carried on.

No fair reasoner can refuse his assent to this theory, when he thus finds it making a capital branch of the general theory of dissolution, espoused by all chymists. Upon examination, it will be found, that every experiment regarding the dissolution of salt in water, holds equally in the dissolution of water in air. In fact, that air is a *menstruum* for water, and that water is suspended in air by way of dissolution, will appear from the following experiments. Let a transparent bottle, containing nothing but air, be well corked, and exposed to the cold of the night. If the cold happen to be considerable, drops of water will be seen next morning adhering to the inside of the bottle, especially in the upper parts, where the cold first penetrates. Again, in the heat of summer, take a transparent globe of glass, in which not a drop of water is visible:

dip it well corked into a vessel of cold water, and in a few minutes will be seen drops of water adhering to the lower parts of the glass. In both experiments, these drops will again be absorbed by the air, when its former heat is restored. This is precisely what happens with respect to salt dissolved in water. Some part of the salt will in cold be precipitated, and again be absorbed when the water is restored to its former heat. The falling of dew after sun-set, when the heat of the air is sensibly diminished, corresponds perfectly to the facts mentioned.

OTHER phenomena attending evaporation are equally analogous to what happen in solution. For, first, solvents or *menstrua* act only on those parts of bodies with which they are in contact; and solution, therefore, is promoted by dividing the solvent into small parts. Thus water in cataracts, by falling from a height and being dashed into spray, is more copiously attracted by the air. Secondly, It always holds, that, when a *menstruum* is saturated with the body dissolved  
in

in it, it will attract no more. This in particular is the case of water saturated with air, and of air saturated with water; for which reason, there is little or no evaporation in a moist air; and, for the same reason, wind, by removing the moist air, to which dry air succeeds, is favourable to evaporation. Thirdly, A *menstruum* dissolves more or less in proportion to its density; because elective attraction must operate with more or less force, in proportion to the quantity of particles in the *menstruum*. This accurately holds in air, which, in proportion to its density, attracts and dissolves a greater or smaller quantity of water. Thus, in air-pump experiments, when a part of the air is drawn out from the receiver, what remains becomes cloudy; and, upon drawing out more air, the inside of the receiver is bedewed with moisture; which, upon re-admitting the air, is again dissolved in it, and the air becomes clear as at first. Fourthly, The action of every *menstruum* is increased by heat, and of air in particular, which is evident

evident from the following experiment, That supposing the dryness of the air and its density to continue the same, more water is evaporated in warm weather than in cold. At the same time, we find evaporation much increased in frost, which is owing to two causes, altogether agreeable to the theory of solution; the first is, that the air being condensed by cold, attracts more water than formerly; the next is, that the dry winds from the north and east, which generally accompany frost, attract water more powerfully than can be done by moist air.

THESE observations suggest the following reflection, That an attempt to reduce summer and winter evaporation to any standard of proportion, which is undertaken by Doctor Hale, resolves into an attempt to give a standard for the heat, the density, and the dryness of the air in summer and in winter. Doctor Hale found possibly in his experiments the summer and winter evaporation to be equal; but he certainly was in the wrong,  
from

from a few experiments, to infer a general conclusion.

THAT an elective attraction between air and water must detain air in water, and water in air, is evident; and that these effects are owing to that cause singly, is extremely probable. But, tho' the same cause must produce the ascent of water into air, properly termed evaporation; yet I have not said that it is the only cause. Evaporation frequently happens in certain circumstances that reject this cause; witness the great quantity of vapour that ascends from boiling water, far beyond the power of this cause.

WITH respect to the ascent of vapour, we have the cause explained to us by Sir Isaac Newton. In the 31st query annexed to his optics, we read, that many bodies, which at a small distance have a mutual attraction, repel each other at a greater distance. His words are: "And  
 " this seems to be evident from the pro-  
 " duction of vapour. The particles sha-  
 " ken off from bodies by heat or fermenta-  
 " tion, are no sooner beyond the reach  
 " of

“ of the attraction of the body, than they  
 “ recede from it, and also from one ano-  
 “ ther with great strength, and keep at a  
 “ distance so as sometimes to take up above  
 “ a million of times more space than they  
 “ did before in the form of a dense body;  
 “ which vast contraction and expansion  
 “ seem unintelligible by supposing the par-  
 “ ticles of air to be springy and ramous  
 “ and rolled up like hoops, or by any o-  
 “ ther means than a repulsive power. The  
 “ particles of fluids which do not cohere  
 “ too strongly, and are of such a small-  
 “ ness as renders them most susceptible  
 “ of those agitations which keep liquors  
 “ in a fluor, are most easily separated and  
 “ rarified into vapour, and, in the lan-  
 “ guage of the chymists are volatile, rarify-  
 “ ing with an easy heat, and condensing  
 “ with cold. And because the particles  
 “ of permanent air are grosser, and arise  
 “ from denser substances than these of va-  
 “ pour, thence it is that true air is more  
 “ ponderous than vapour, and that a  
 “ moist atmosphere is lighter than a dry  
 “ one, quantity for quantity. From the

“ same

“ same repelling power it seems to be,  
 “ that flies walk upon water without wet-  
 “ ting their feet,” &c.

HERE is good authority, that an elective repulsion is the cause of vapour. But, to give all the light possible to an obscure subject, some additional observations may be proper with respect to an elective attraction being converted by change of circumstances into an elective repulsion. It appears from experiments made by Doctor Hale in his vegetable statics, that, of every vegetable, air makes a component part; that, particularly, air makes the third part of the weight of a green pea; a quantity that, in the natural state of air, would occupy many cubic feet. It is a known property of air, that its particles have a mutual repulsion; and there must be a vigorous elective attraction between air and the substance of a vegetable, to condense the former so much within the latter. This elective attraction is by heat converted into an elective repulsion, which, when green wood

is set on fire, makes the air fly off with great impetuosity.

IT is an elective attraction, as above observed, that confines air within water. Heat, by its power of expansion, separates the particles of air and water at a greater distance from each other; and this circumstance, without other change, converts the mutual attraction into a mutual repulsion, by which the air, as the lighter body, flies upward.

We find not any mutual attraction between the particles of water. On the contrary, as water is expanded by heat, and condensed by cold, it is certain that the particles of water in its natural state never come into contact; and to what other cause can this be owing but to a mutual repulsion? Such then is the condition of water, that by mutual repulsion the particles are kept distant from each other; and tho' by a contrary agency, overcoming in part the mutual repulsion, the particles are brought nearer to each other, yet hitherto there has not been discovered any power sufficient to force the particles into actual

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contact. But if this case afford not an instance of attraction being converted into repulsion, it affords an instance of a change not less extraordinary, *viz.* a repulsion confined within a very small sphere of activity, converted into a repulsion having a very large sphere. It is observed above, that heat increases the force of elective attraction; and here I have occasion to observe, that it has the same effect with respect to elective repulsion. Heat, by increasing the repulsive power of the particles of water, expands it to a greater bulk, perhaps about  $\frac{1}{27}$ , more or less in proportion to the degree of heat under that of boiling water. But, as soon as the water begins to boil, the mutual repulsion is increased to such a degree as to convert the surface of the water into vapour, which is water expanded 14,000 times beyond its usual state. And accordingly, tho', during the inferior degrees of heat, there is little evaporation; yet, when water boils, vapour is thrown up in great plenty.

AND

AND thus in the ascent of vapour from boiling water, we have discovered another cause of evaporation, viz. a mutual repulsion among the particles of water. This power, by expanding the water so as to make it 17 times lighter than air, makes it, in the shape of vapour, ascend into the air; and tho' it be there soon again condensed by the cold of the air, yet it is kept suspended by the mutual attraction between air and water.

NEITHER of these causes will account for the evaporation of water in *vacuo*. Elective attraction will not answer when there is no incumbent air to attract the water. Nor will mutual repulsion answer; because, in evaporation in *vacuo*, there is not supposed to be any extraordinary heat. The best way to account for this supposed evaporation, at least the easiest, is to deny the fact, which may be done *bona fide*, for I have not heard of any experiment that verifies it. I shall venture only a single hint, that an elective attraction betwixt glass and water, supposing the fact to be ascertained, will fairly account for the phenomenon.

## ART. IV.

*Copy Letter from Mr TURNBULL to ARCHIBALD MENZIES, of Kildires, Esq; dated from Delphos, concerning Italy, the alledged effects of the Bite of the Tarantula, and Grecian Antiquities.*

DEAR SIR,

I HAVE not ventured to give you any of my observations on Italy, as it would have been troubling you with what you must have looked into with more intelligence than I pretend to. However, I cannot help mentioning the seemingly declining state of that part of Europe, but more particularly of the Roman state, which I think is more evidently on the decline than any of the others. You must have observed, at present it is so thinly inhabited, that many places remain uncultivated, part of which is always covered with standing water. This,  
in

in the winter, renders the neighbourhood of these places unwholesome, by the raw and damp exhalations which arise from them, and still more so in the summer, by their noxious putrid vapours, probably the cause of the malignant putrid fevers so fatal in those parts every summer and autumn. I think also, that the health of the Pope's subjects suffers much from the strict observance of their lents and fasts: The lower class of people are generally supplied with very bad food on meagre days, not being able to purchase fish while fresh, and consequently never eat any till half corrupted, at that time the most unwholesome of all food in a hot country. From these and other causes, the health of the Romans is so much impaired, that several of them seemed to be almost, if not quite, rendered incapable of promoting their species. The continued endeavour also of their holy directors, to engage numbers to a monastic life, added to the other disadvantages of a like kind, will certainly strike very deep in some ages more, and will thin the country of inhabitants,

by

by destroying some, and preventing generation in others. It is surprizing, that, in this age, tenets of such a tendency should be followed; it being palpable how destructive they are to the design of the creation and interest of princes, as they forbid the propagation of the species to perhaps a sixth of the community, and, by ill judged absurd rules with regard to diet, cause the destruction of many of the rest. I can affirm the latter with so much the more certainty, I mean the bad effects of such restrictions in diet, as I have observed in my practice, that almost all the chronic diseases of the papists were contracted in their long ient. The health of all the Italians is certainly much hurt by this way of living; for they have not a robust air in general, numbers being wasted and enervated. Their looks and diseases struck me the more, as I came from a country where sobriety and a temperate use of every thing show, by their salutary effects, how much such a diet conduces to the health and strength of the body; for there are  
but

but few among the eastern nations, which I have seen, either crooked or deformed. This, Sir, you observed, no doubt, when at Constantinople, and other places of this empire. Their following nature more than we do, may also conduce much to the strength of the body; for they never force it into shape by bandages and whalebone, but leave nature to finish and perfect her own work.

IN my last from Rome, I acquainted you of my intentions of going into Greece and Asia Minor, by the way of Otranto, Corfry, and so on. I was joined at Rome and Naples by Messrs Skipwith, Willbraham, and Fitzgerald. As we made some stops in our way to Otranto, we did not leave Italy till the 7th of February. That part of the kingdom of Naples which is on this side of the Apennines, is both fertile and pleasant; but the people are so wretchedly poor, that it seems to be inhabited by beggars, numbers of whom followed us from every village for charity. They seemed, by their diseased bodies and starved looks, to be in extreme  
poverty

poverty and wretchedness. Tho' Apulia is one of the finest and most fertile provinces of the kingdom of Naples, the inhabitants are rather poorer than in the others. They complained that the Jesuits, their masters, were too hard upon them. That society has very large possessions in that province, and of the very best of the land.

As the effects of the sting or bite of the tarantula seemed always very extraordinary to me. I took some pains in inquiring into this affair in the places where these bites were reported to be most frequent; and found, from the best information in different places, given me by men of credit and capable of judging in such an affair, that the diseases which are said to proceed from these bites are such as are caused by summer-heats in all southern countries. The reapers are most subject to the fevers imagined to be caused by the bite of the tarantula, which, according to the heat or temperature of the season, are more or less violent. But the general, and what may be called the epidemica

epidemical disorder of all those places, in the summer and autumn, is the ague, or intermitting fever. As it is concluded that the cause of this disease is the bite of the tarantula, the cure is always attempted by dancing to music for a considerable time, even for hours; and, if the sick person has not strength enough to go thro' this exercise, he is assisted or supported till a sweat is brought on; or, if weakness prevents his getting out of bed, then he moves his body, arms, and legs, as much as possible in bed; and being assisted in this exercise by his friends, as well as by a free use of cordial wines, a plentiful sweat is generally procured, with such a lassitude as disposes to rest and sleep; during which, if the sick person continues to sweat plentifully, a crisis is brought on; if not, the same method of cure is renewed, as soon as a recovery from the former fatigue permits. The same dancing cure is always tried for relapses, even in agues, though a twelvemonth afterwards. As there is scarce a disease to which the body is subject, but what

they think proceeds from the bite of the tarantula, this method of cure is universally practised, and with so much success, that it seems miraculous, and is esteemed the effect of the music by prejudiced minds. They say that the music charms the poison of the bite; the mark, however, of a bite, is never felt or seen on any part of the body; even the most prepossessed could not say they had seen the least mark of this kind on the persons affected. Though many great men have given credit to the effects of this poison, and some have accounted for them with great ingenuity; yet I am not afraid to assert, that the disorders imagined to be caused by the bite of the tarantula, are occasioned by the heats to which these people are exposed in getting in their harvest. I had every advantage I could wish for to inform myself of this affair, and from men of discernment, who had taken some pains in visiting and examining the sick said to be bit; among the rest, the archbishop of Otranto, of the noble family of the Carraccioli of Naples.

This

This learned prelate assured me, from what he had seen of it, that it was a ridiculous vulgar notion, full of imposture and prejudice, and entirely void of foundation. He concurred, indeed, in opinion, with most men of judgement in those parts, that these diseases proceeded from other causes. This seemed the more probable, and even clear to me, having had numberless opportunities of treating such diseases in hot countries as are ascribed to this bite, and I always found that they were caused by the heats of the mid-day sun. Though Malta is rather a wholesome climate, yet the summer-heats cause very fatal fevers there, as well as other diseases; among the rest, a tetanus, or tense stiffness of the whole body, to such a violent degree, that it generally proves mortal in twenty-four hours, if the person affected is not relieved by a plentiful sweat. This, though rarely, happens also in Otranto, and other places, and is looked upon as an undeniable proof of the bite of the tarantula; but, in Malta, they ascribe it to the being exposed

exposed

exposed to too great heats; for there a contrary prejudice runs so high, that they deny the venomous power of all animals, since the time of St Paul's shaking the serpent from his hand into the fire, when he was cast away on that island. As to what has been believed, that the bite of the tarantula causes a lethargic drowsiness, from which the person affected cannot be roused but by such music as strikes his fancy and pleases: This is not so; for the sick person is always entreated and solicited to use this exercise; and, as a further incitement, they strike up such airs as the patient likes, or which, on trial, they find strike his fancy. The belief of such symptoms arises from the practices of tricking vagabonds, called *tarantulisti*, who go about the kingdom of Naples pretending to be bit by the tarantula. They always affect these symptoms, and pretend to be roused by certain airs, to which they dance in a strange extravagant manner. It is probable that you saw some of them at Naples. Perhaps this method of cure might  
succeed

succeed in some particular cases, instead of other gymnastic methods generally ordered.

WE touched at Corfu, where we admired the mildness of the climate, and the fertility of the soil, which justifies Homer's praises of its pleasantness, and the uninterrupted succession of its fruits. His description of the river in which Ulysses swam, of the gardens of Alcinous, and of the Port, are so striking and just, that it seems easy to determine their situation, though the reality of them has been doubted of by other travellers. I have often remarked what has been observed by many, that, in speaking of countries and cities, this great poet generally mentions some few remarkable indelible properties or characters by which they are ever after easily known.

The first place we landed at in the Peloponnese, was Patras, where, among the few remains of antiquity still extant, I saw the well famous for its prognosticating the fate of the sick who consulted this oracle. Pausanias speaks of it, as if he  
did

did not believe it even in those times. I observed, that by the contrivance of a vaulted passage to it, the light is very artfully thrown into the well; and, according to the time of the day, or spot on which the operator stood, the image reflected by the looking glass, would be stronger or fainter as the manager pleased. If the image reflected was strong, and seemingly healthy, then the prognostic was good; but, if faint or pale, bad. No doubt, but the priests and servants of this oracle informed themselves well of the state of the sick person, before they risked the credit of the oracle by the prognostic. The Greeks in Patras firmly believe, that St Andrew was crucified nigh this well, and numbers of them resort to it the first Sunday of Lent, to drink of the waters of it as a preventer of diseases. This superstition probably arises from a tradition of the ancient miraculous circumstances attending this well, though the mode of consulting it is forgot.

We climbed Parnassus, to see the ruins of Delphos, in our way to this place.

That

That city was situated on the side of a steep and very high rocky mountain, where the air is cool, sharp, and clear, which must have contributed to invigorate and enable the servants of this oracle to sustain the fatigue of such studies as were necessary to qualify them for keeping up the credit they had acquired to their oracle. I think that the situation must have contributed much to increase the opinion and devotion of those who went to consult it; for, as it is situated on the side of a craggy mountain, with steep and tremendous precipices hanging over it, and appears to the greatest advantage in going into the town, these objects, seemingly frightful, added to the firm belief of the presence of a divinity, probably struck awe and terror into the votaries, and helped to strengthen every prejudice in its favour. It highly justifies the discernment of the person who chose this place to lodge his god. I remarked, that the air on the tops of the rocks of Parnassus that are immediately above the town and fountain of Castalio, was more remarkably

markably sharp and seemingly invigorating than below; and I observed that the kids and goats feeding there were more frisky than any I had seen. Probably this was accidental, though it is not altogether unreasonable to suppose, that the air possessed an invigorating and bracing quality, which formerly gave such gaiety and alacrity to the shepherds and flocks, when they went to the tops of those rocks, that it was imagined to be occasioned by an inspiration from the crannies of the mountain; and we read that it was for the benefit of this holy *flatus*, that the Pythean goddesses or priestesses first gave her answers from the tops of these rocks; but afterwards, for the convenience of a better situation, they were given from a certain place in the temple of Apollo immediately under the two rocky heads of Parnassus. Some pieces of well built strong marble walls of the temple and other public edifices, are the only remains to be found in this place, except the *stadium*, which still preserves its form and many of its seats.

This

This once very great depository of the most precious commodities, and elegant pieces of workmanship which nature or art could produce, is now one of the most miserable villages I ever visited. This also is the present state of all the other places I have seen that were supported and enriched by the credit of an oracle. The situation of them was generally dreary and uncouth, and consequently they are now abandoned for more convenient and pleasant habitations.

THIS place has afforded little satisfaction as to antiquities, twelve columns of a portico being all we find here; they are of the Doric order, and, I believe, the shortest in proportion to their diameter now found; the length or height of the shaft is 20 feet 4 inches; the circumference 13 feet 9 inches; the diameter 5 feet 4 inches; so that the height of the shaft is not quite four diameters, instead of eight, which, I think, is the present proportion of the shaft of a Doric column. We returned here yesterday from visiting

the spot where the Nemean games were celebrated. We found some columns standing there among the ruins of a temple. These were also of the Doric order; the height of the shaft of the columns was six diameters, which seems to have been the proportion generally followed in Pliny's time; but, from the measures of some of the principal buildings at Athens which I took before, I find, that five diameters was the general standard there. We intend to leave this place in a day or two, and think of taking a view of the mines of Megara and Eleusis in our way to Athens.

YOUR desiring me, Sir, to give you some of my remarks now and then, will, I hope, apologize for my troubling you with these, taken from my notes rather in a hurry. I send this by a ship loading corn here for Marfailles, and the master of the vessel promises me to take good care of it: After visiting the ruins of Athens once more, and some of the islands in our way to Smyrna, I intend to take

a tour for fifteen or twenty days into Asia Minor, and then to depart to France by the first good ship bound to Marfailles, from whence or from Smyrna I'll trouble you with another letter. I am, Sir, your most obliged, and obedient humble servant.

*Letter*

## ART. V.

*Letter from Dr AUSTIN physician, to Dr  
MONRO, jun. on the Effect of Electricity  
in removing Obstructions of the Menfes.  
Dated Edinburgh 1764.*

S I R,

THE following case gave me great pleasure; it shows the good effects of electricity in removing obstructions of the menfes. If you think it will be of use, I give you leave to communicate it to the Philosophical society.

MISS ———— aged twenty-four, of a delicate constitution, was subject to violent head-achs from the time she was eight years of age, which her mother attributed to a fall she got on the head.

HER *menfes* began to flow when she was about sixteen, and for some time she continued pretty regular.

IN June 1760, during the time of her *menfes*, she was exposed to a great rain, and was much wet. The *menfes* suddenly

denly stopt; and from this time she was in a very bad state of health. Her symptoms were, constant head-achs, lassitude, pain in her back, dejection of spirits, and such a disorder in her stomach, that she vomited every thing she eat; her pulse low, and so slow that it beat only betwixt forty and fifty strokes in the minute.

To remove these complaints, which seemed to proceed from an obstruction of the *menses*, I ordered her vomits of different kinds, elix. sac. bark, steel, bitters, in short, all kinds of deobstruent medicines, and all to no purpose. Ligatures too were put round her thighs, as described by Dr Hamilton in *Essays Physical and Literary*, vol. 2. p. 403. and she went to the country, and rode every day: But all in vain; no return of the *menses*. She says, that drinking germander tea carried off the disorder in her stomach, and her appetite turned better.

UPWARDS of a year ago, finding I could do her no service, I gave over visiting her.

ABOUT

ABOUT the middle of last February, I happened to meet with her mother, and asked about her daughter's health; she told me, she was much in the old way, full of complaints, and never altered since June 1760, almost four years. I advised her to take Miss to the Royal Infirmary, and try what electrifying her would do. She went accordingly about five in the afternoon, on the 17th of February, and received nine smart strokes of electricity on the ancles, which made her start a little. In returning home, she complained of a pain in her ancles, and about eight in the evening, the *menfes* plainly appeared, and continued flowing for three days in as great a quantity as ever.

I desired her not to be electrified again, till the next period was past, and that, if nothing happened, she was then to be electrified; but, in twenty-seven days, she had her *menstruae* again, and in the usual quantity.

HER health and spirits have been better ever since, and she is growing fat.

I inquired at the Infirmary, if any young women came to be electrified for that complaint; I was told, that several did, and that in some the effect was so sudden, that they altered before they left the house.

I am, &c.

*Remarks on the foregoing Letter, by the late  
Dr D. CLARK.*

THE case which Dr Austin has related to this society, of an obstinate obstruction of the *menfes* being removed by electricity, is a very good one, and is much in favour of that remedy. I have often used electricity in the Infirmary with the same view, and generally succeeded, even when other good remedies failed. However, I do not know if it would have answered in these cases, if the other methods of cure had not been premised by way of preparation. In some cases of obstructed *menfes*, I have known the electricity fail me, even when I thought the patient properly

perly

perly prepared for it; but that was seldom. In general, it seemed to answer best, when there was a languid circulation and a slow pulse.

IN short, the obstruction of the *menfes* is the disease, of any that I have found, electricity answers best in, except the *ophthalmia*. For, in the *ophthalmia*, after one bleeding and perhaps a dose of physic, I have often seen it cure, or at least be of great service. In bad cases, I commonly make that bleeding from the temporal arteries either by leeches or by the lancet.

Edin. Sept. 6.

1764.

## ART. VII.

*The Effects of a very large Dose of Opium, by  
the late Dr DAVID CLERK Physician  
in Edinburgh.*

**A.** B. aged 28, of a middling strength, and of a melancholic temperament, enjoyed very good health till about the month of January last, when, on account of some private affairs, his spirits began to sink, and he was seized with a giddiness, headach, and weakness of his eyes. He became likewise troubled with pains in both his arms, extending from the elbows to the shoulders, the affected parts having a sensation of fulness, as if they were like to burst. These pains were worst when out of bed, especially when in exercise. About the middle of February he applied to a surgeon-apothecary in town for relief, who ordered him a vomit, a dose of rhubarb, and some doses of the bark, he having

complained to him chiefly of a weakness and wind in his stomach; however, he took neither the vomit nor rhubarb, but only the bark, which had the effect to make his belly looser, and to mend his appetite a little. About the beginning of April, he began to have a slight pain in the region of the kidneys, and a pain in making water; his urine was thinner than usual; but no sand or stones appeared in it.

HAVING read in a Magazine that the Turks used opium for raising their spirits, and that they took it in large quantities with a very good effect, and, not suspecting any danger from it, he resolved to try it in nearly the same dose which he found mentioned there. Accordingly, he bought three doses of crude opium of a drachm each, and, on April 8th, about two o'clock, after having eat a bason of broth to dinner, he swallowed a half of one of the doses, having first chewed it well: Then he eat a bit of boiled beef, unsalted, without drinking any thing above it. About half an hour after taking the opium, he found it extremely agreeable and cordial, even  
more

more so than wine used to be; it having carried off his headach, and the heaviness of his eyes, and lessened the pains of his arms, and made him in short perfectly well, as he thought, finding more life, spirits, and vigour than he had ever had before. In about ten minutes after, he began to eat the other half of the opium, chewing a part of it; but the rest he made up into three small pills, which he swallowed, having consumed the whole of it in about two minutes.

ABOUT twenty minutes after this, he was seized with a great giddiness and confusion of his head and eyes, and a debility, so that he could not walk, an uneasiness over his whole body, and sickness at his stomach; he thought flashes of fire came from his eyes, and saw frightful spectres.

BEING then sensible that the opium had hurt him, he drank a large draught of cold water, and afterwards some warm water, by which he vomited briskly. Then he drank two glasses of wine and vomited again, when he felt the taste of the opium  
strong

strong in what he threw up. Having a great drought, he drank a great deal more warm water, and continued vomiting all the afternoon. About eight in the evening, his surgeon-apothecary saw him, and made him continue to drink warm water, vomiting always from time to time, till half an hour after nine, at which time I first visited him.

He complained then of a confusion in his head and giddiness, though not near so violent as they had been some hours before. He had likewise a general heat and drought which had continued from the time that he began to vomit. He said that he had slept only a few minutes between seven and eight o'clock; for, though he was drowsy and endeavoured to get sleep, he found it would not come. His pulse was eighty-two in a minute, weak and soft. I ordered him immediately two ounces of *elixir sacrum*, to be taken at twice, with a little interval; I forbid him to drink any more water, and prescribed a blister to be applied to his back.

AT half an hour past ten, I found that he had thrown up the first half of the elixir, his pulse was a little fuller, and 86 in a minute, but still soft. The heat and drought continued. He had taken two spoonfuls of the *julapium salinum* at eleven; but had thrown it up.—Ordered his feet and legs to be put into warm water, the julep to be continued, and warm negas to be drunk in order to procure a sweat.

April 9. 11 a. m. I found that, after the blister was applied, his legs bathed, and the drinking of some warm negas, a sweat immediately broke out. Soon after he fell asleep, and slept sound till morning, having had no disturbing dreams, as he used to have formerly in his ordinary bad health; and he awaked greatly relieved. Has still some confusion and pain of his head, as he used to have before taking the opium, together with a heat at his heart, as he calls it, which, he says, is no new thing to him. Thirst not quite gone. Has had no stool and made no water. Pulse 96, and somewhat weak. Took but one dose of the julep in the night.

night.——Ordered a laxative glyster to be given immediately.

7 p. m. One stool from the glyster. A good discharge from the blister. Eat some broth and bread to dinner, but with little appetite. Got out of bed at four o'clock, and has sat up ever since. Has less of the pains of his arms, and likewise of the headach and giddiness, than he had before taking the opium; but the back part of his head is now most affected; whereas it formerly was the forehead. Has made some high-coloured water without pain. Pulse 92, and weaker than in the morning. Face somewhat swelled.——*R. elix. sacri unc. et dimid. b. f.*

April 10. 1 p. m. Slept only three hours last night: Used to sleep well formerly. Sweated much. Has pains through all his bones, chiefly from the haunches downwards; but little of the usual pains in his arms. Pulse 84, and weak.

7 p m Sweated all day till five o'clock, when he got up; after which the pains grew easier, and soon left him altogether. Got very little sleep. Pulse

80, and, for the first time, of a natural fulness. No stool since yesterday.—

*Repet. enema u. a. R. Aloes Socotrinae, saponis Hispan. scrup. ii. syrupi commun. q. s. ut f. pilulae xii. Sumenda b. s.*

April 13. 12 m. HAD three stools from the glyster on the night of the 10th, and two stools next day from the pills. Began on the 10th to take six ounces of an infusion of camomile-flowers twice a-day, and continues it. Stomach and spirits better. One natural stool yesterday, and another to-day. Makes his water easier. Pains of arms not quite so troublesome. Giddiness and pain in the fore-part of his head as formerly. Sleeps little. Pulse 80, and pretty full and strong.

As he was now in nearly the same state of health he had enjoyed before taking the opium, I left off visiting him, having desired him to drink twice a-day six or eight ounces of an infusion of equal parts of camomile and wild valerian.

BEFORE parting, he begged of me that I would allow him to try one other dose of the opium; for that the pleasure which he had had from the last dose, though of very short duration, was inexpressibly great while it lasted.

JULY 17. 1766.

ART.

## ART. VIII.

*Letter from Dr B. FRANKLIN to D. HUME,  
Esq; on the Method of securing Houses from  
the Effects of Lightning.*

*London, Jan. 24. 1762.*

DR SIR,

IN compliance with my Lord Marishall's request, communicated to me by you, when I last had the pleasure of seeing you, I now send you what at present appears to me to be the shortest and simplest method of securing buildings, &c. from the mischiefs of lightning. Prepare a steel rod five or six feet long, half an inch thick at its biggest end, and tapering to a sharp point; which point should be gilt to prevent its rusting. Let the big end of the rod have a strong eye or ring of half an inch diameter: Fix this rod upright to the chimney or highest part of the house, by means of staples, so as it may be kept steady. Let the pointed end be upwards, and rise three or four

feet above the chimney or building that the rod is fixed to. Drive into the ground an iron rod of about an inch diameter, and ten or twelve feet long, that has also an eye or ring in its upper end. It is best that the rod should be at some distance from the foundation of the building, not nearer than ten feet, if your ground will allow so much. Then take as much length of iron rod of about half an inch diameter, as will reach from the eye in the rod above, to that in the rod below; and fasten it securely to those rods, by passing its ends through the rings, and bending those ends till they likewise form rings. This length of rod may either be in one or several pieces. If in several, let the ends of the pieces be also well hooked to each other. Then close and cover every joint with lead, which is easily done, by making a small bag of strong paper round the joint, tying it close below, and then pouring in the melted lead; it being of use in these junctures, that there should be a considerable quantity of metalline contact between piece and piece.

For,

For, if they were only hooked together, and so touched each other but in points, the lightning, in passing through them, might melt and break them where they join. The lead will also prevent the weakening of the joints by rust. To prevent the shaking of this rod by the wind, you may secure it by a few staples to the building, till it comes down within ten feet of the ground, and thence carry it off to your ground-rod; near to which should be planted a post, to support the iron conductor above the heads of people walking under it. If the building be large and long, as an hundred feet or upwards, it may not be amiss to erect a pointed rod at each end, and form a communication by an iron rod between them. If there be a well near the house, so that you can by such a rod form a communication from your top-rod to the water, it is rather better to do so than to use the ground-rod above mentioned. It may also be proper to paint the iron, to render it more durable, by preserving it from rust.

A building thus guarded, will not be damaged by lightning, nor any person or thing therein killed, hurt, or set on fire. For, either the explosion will be prevented by the operation of the point; or, if not prevented, then the whole quantity of lightning exploded near the house, whether passing from the cloud to the earth, or from the earth to the cloud, will be conveyed in the rods. And though the iron be crooked round the corner of the building, or make ever so many turns between the upper and lower rod, the lightning will follow it, and be guided by it, without affecting the building. I omit the philosophical reasons and experiments on which this practice is founded; for they are many, and would make a book. Besides they are already known to most of the learned throughout Europe. In the American British colonies, many houses have been, since the year 1752. guarded by these principles. Three facts have only come to my knowledge of the effects of lightning on such houses, which I shall here give you.

THE first was some years since, on the house of Mr Raven, at John's Island, near Charlestown, South Carolina. As the size of a conductor sufficient for conveying the lightning could only be discovered by experience, this gentleman has used small brass wire to connect the upper and lower rods. It went down on the outside of his chimney, which stood at the end of the house. Within the chimney stood, leaning against the back, a musket or gun. The lightning passed in the wire, small as it was, except where furnished with a better conductor by the gun-barrel, between the top of which and the wire it made a very small hole through the wall, and in that place, and all above it, melted and separated the wire. If I mistake not, (for I write this from memory only), some hurt to the lower part of the gun-stock, and a few bricks of the hearth broken up, was all the damage done at this house: And this being ascribed to the smallness of the wire, which occasioned the lightning to deviate into  
the

the gun-barrel, larger conductors were afterwards more generally used.

THE second was the house of Mr William Mayne of the same Province. He hath provided a conductor from the top to the bottom of his chimney composed of iron rods of near half an inch diameter, linked together by hooks, turned at their ends, the lowest joint being in the ground about three feet deep, close to the foundation of his chimney; and the highest about six inches above the top, terminating in three brass wires, with silver points. The lightning passed in this canal, melted and dissipated the brass wires with their points, melted and burst the joints of the rods, so as to unhook and separate them; but did no damage to the chimney, except near the foundation, where some bricks were torn out, and some bricks of the hearth within forced up; the earth also for eight or nine inches round the rod was furrowed and torn up. This small damage appeared to be occasioned by the ground-rod's not entering the earth deep enough, and being placed too near the  
foun-

foundation of the chimney: Four persons were in the house, and one within a few feet of the chimney. They were stunned with the noise, which was extremely great; but otherwise received no hurt.

THE third instance, I lately received an account of from Mr Kinnerfley, an ingenious electrician of Philadelphia, which I shall give you in his own words, from his letter to me, dated March 21. 1761.

‘ We had four houses in this city, and a  
 ‘ vessel at one of the wharfs, struck and da-  
 ‘ maged by lightning last summer; one  
 ‘ of the houses was struck twice in the  
 ‘ same storm. But I have the pleasure  
 ‘ to inform you, that our method of pre-  
 ‘ venting such terrible disasters has, by a  
 ‘ fact which like to have escaped our  
 ‘ knowledge, given a very convincing  
 ‘ proof of its great utility, and is now in  
 ‘ higher repute with us than ever.

‘ HEARING a few days ago, that Mr Wil-  
 ‘ liam West merchant in this city, suspected  
 ‘ that the lightning, in one of the thunder-  
 ‘ storms last summer, had passed through  
 ‘ the

' the iron conductor which he had pro-  
 ' vided for the security of his house, I  
 ' waited on him to inquire what ground  
 ' he might have for such a suspicion. Mr  
 ' West informed me, that his family and  
 ' neighbours were all stunned with a very  
 ' terrible explosion, and that the flash and  
 ' crack were seen and heard at the same  
 ' instant; whence he concluded that the  
 ' lightning must have been very near;  
 ' and as no house in the neighbourhood  
 ' had suffered by it, that it must have pas-  
 ' sed through his conductor. Mr White,  
 ' his clerk, told me, that he was sitting at  
 ' the time by a window about two feet  
 ' distant from the conductor, leaning a-  
 ' gainst the brick-wall, with which it was  
 ' in contact, and that he felt a smart sen-  
 ' sation like an electric shock in that part  
 ' of his body which touched the wall.  
 ' Mr West farther informed me, that a  
 ' person of undoubted veracity assured  
 ' him, that being in a door of an oppo-  
 ' site house on the other side of the street,  
 ' he saw the lightning diffused over the  
 ' pavement, which was then very wet with  
 ' rain,

' rain, to the distance of two or three  
 ' yards from the foot of the conductor:  
 ' And that another person of very good  
 ' credit told him, that he, being a very  
 ' few doors off, on the other side of the  
 ' street, saw the lightning above, darting  
 ' in such direction, that it appeared to  
 ' him to be directly over that pointed  
 ' rod.

' UPON receiving this information, and  
 ' being desirous of farther satisfaction,  
 ' there being no traces of the lightning  
 ' to be discovered in the conductor, as far  
 ' as we could examine it below, I proposed  
 ' to Mr West our going to the top of the  
 ' house to examine the painted rod; af-  
 ' furing him, that if the lightning had  
 ' passed through it, the point must have  
 ' been melted: And, to our great satisf-  
 ' faction, found it so. This iron rod ex-  
 ' tended in height about 9 feet and an  
 ' half above a stack of chimneys to which  
 ' it was fixed; it was somewhat more than  
 ' half an inch diameter in the thickest  
 ' part, and tapering to the upper end.  
 ' The conductor, from the lower end of it

' to the earth, consisted of square iron  
 ' nail rods, not much above a quarter of  
 ' an inch thick, connected together by in-  
 ' terlinking joints. It extended down the  
 ' cedar roof to the eaves, and from thence  
 ' down the wall of the house, four stories  
 ' and a half, to the pavement, in Water-  
 ' street, being fastened to the wall in feve-  
 ' ral places by small iron hooks. The  
 ' lower end was fixed to a ring in the top  
 ' of an iron stake that was down about  
 ' 4 or 5 feet into the ground. The above  
 ' mentioned iron rod had a hole in the top  
 ' of it, about two inches deep, wherein  
 ' was inserted a brass-wire about two lines  
 ' thick, and, when first put there, about  
 ' ten inches long, terminating in a very  
 ' acute point; but now its whole length is  
 ' no more than seven inches and a half,  
 ' and the top very blunt. Some of the  
 ' metal appears to be missing, the slender-  
 ' est part of the wire being, as I suspect,  
 ' consumed into smoke. But some of it,  
 ' where the wire was a little thicker, be-  
 ' ing only melted by the lightning, sunk  
 ' down while in a fluid state, and formed

‘ a rough irregular cap, lower on one side  
 ‘ than the other, round the upper end of  
 ‘ what remained, and became intimately  
 ‘ united therewith.

‘ THIS was all the damage that Mr  
 ‘ West sustained by a terrible stroke of  
 ‘ lightning. A most convincing proof  
 ‘ of the great utility of this method of  
 ‘ preventing its dreadful effects.

‘ MR WEST was so good as to make me  
 ‘ a present of the melted wire, which I  
 ‘ keep as a great curiosity, and long for  
 ‘ the pleasure of shewing it to you. And  
 ‘ now, Sir, I most heartily congratulate  
 ‘ you on the pleasure you must have in  
 ‘ finding your great and well grounded  
 ‘ expectations so far fulfilled,’ &c. Thus  
 far Mr Kinnerly.

You will observe, Sir, that the size or  
 thickness of the conductor I direct, is  
 much greater than this of Mr West’s,  
 which nevertheless proved effectual; but,  
 the quantity of lightning discharged in  
 some strokes being probably much great-  
 er, I prefer a larger conductor as the sa-  
 fer. If I have not been explicite enough  
 in

in my directions, I shall, on the least intimation, endeavour to supply the defect.

I am, &c.

*Report on Dr Franklin's Method of securing Buildings, &c. from the Mischiefs of Lightning, by Professor RUSSEL.*

THE Doctor's description of his method is the neatest and most distinct imaginable. No body can be at a loss to put it in practice. Two remarks only have occurred to me, which I shall lay before the society. One is, That when a building, proposed to be guarded in this manner, is partly covered with lead, or has the water conveyed from the roof to the ground in leaden pipes; the lead, so far as it goes, may easily be made to supply the place of the iron conductor. This would be done by conducting the iron rods from the top to the nearest part of the lead, and there connecting the iron with the lead, by means of solder, in the

same

same manner that the Doctor proposes that the iron-rods should be connected to each other; and then forming the connection between the ground-rod and that part of the lead which comes nearest to it, in the same manner. The other remark which I proposed to make is this: The Doctor directs, that when the conductor comes down within ten feet of the ground, it should thence be conveyed off from the building towards the ground-rod, and supported by a post above the heads of people walking under it. Now, I apprehend, it would be more convenient, and less operose, to carry this last part of the conductor a foot or two under ground.

## ART. IX.

*Method of determining the Strength and Direction of Earthquakes, by the late Rev. Dr WARK, Minister at Haddington.*

*Lisbon, December 26. 1764.*

**B**ETWEEN two and three in the morning, I was awaked by a dreadful shower of rain, accompanied with great blasts of wind, and flashes of lightning almost uninterrupted, most of which ended in bright purple. In the forenoon we had the addition of a good deal of thunder. About eleven the sun shone forth, and, in less than half an hour after, we had a smart shock of an earthquake, preceded by a rumbling noise, and followed by a dead calm of about half an hour. Most of the people I am acquainted with say, it was fully as severe as any one shock in the great earthquake; and all of them maintain, it was intirely different from any thing of the kind they have felt before.

fore. The former shocks, it seems, were undulatory; this was a sudden perpendicular heave. As it did not last (to my apprehension) more than two seconds, it did little or no damage; none indeed that I hear of, excepting some rents in churches, and other heavy buildings.

I have since thought of a method to determine the strength and direction of any future earthquake. A vessel, the portion of a sphere of 3 or 4 feet diameter, set on a ground-floor, is powdered over on the inside by a barber's puff; then a sufficient quantity of water is gently poured into it. Upon the smallest tremor, the water rising on the vessel, will shew both the height and direction of the shock by washing down the powder. The curious here, whose superstitious fears will allow them, are already putting it in practice. As, by this attempt, it appears possible to subject this awful phaenomenon to experiment, I hope it will induce others to extend their inquiries this way. If, in the different places of the globe where earthquakes are frequent, distinct registers were kept

kept of their force and direction, might not some useful discovery be expected on comparing them?

*Toulouse, January 6. 1766.*

DOCTOR WARK carried this with him from Edinburgh, with a resolution of having corrected and enlarged it, from the observations he had made on the effect of the great earthquake at Lisbon; but, growing weaker and weaker every day, he was never able to effect it. Soon after he had communicated the above method of discovering the strength and direction of earthquakes by water to an ingenious gentleman at Lisbon, he found it would be very uncertain, as water, especially when exposed to the open air, undergoes a speedy evaporation; he therefore advises, in place of water, to use mercury, and to cover the vessel with a piece of transparent glass, so that no dust may enter.

*N. B.* DR WARK died on the 14th of January, eight days after dictating the above.

## A R T. X.

*An Account of the Indian Pink, by ALEX. GARDEN, M. D. in Charlestown, South-Carolina, Member of the Royal Society at Upsal, and of the Philosophical Society of Edinburgh, communicated in three Letters, and presented by Dr Hope.*

## L E T T E R I.

**T**HE Indian Pink grows plentifully in the low rich lands of South-Carolina, springing up annually from the old roots about the middle of March, and in May, June, and July producing large flowers of a very rich red colour on their outside, equalling in beauty the scarlet Lobelias; on the inside they are of a dilute yellow colour. It generally grows above 16 inches high, seldom or never exceed-

ing 30, and is well garnished with leaves; it never produces branches, unless the main stalk is broke off. About 40 years ago, the anthelmintic virtues of the root of this plant were discovered by the Indians; since which time it has been much used here by physicians, practitioners, and planters; yet its true dose is not generally ascertained. I have given it in hundreds of cases, and been very attentive to its effects. I never found it do much service, except when it proved gently purgative. Its purgative quality naturally led me to give it in febrile diseases, which seemed to arise from viscidities in the *primæ viæ*; and, in these cases, it succeeded to admiration, even when the sick did not void worms.

I have of late, previous to the use of the Indian Pink, given a vomit, when the circumstances of the case permitted it; and I have found this method answer so well, that I think a vomit should never be omitted. I have known half a drachm of this root purge as briskly as the same quantity of rhubarb; at other times I  
 have

have known it, though given in large quantities, produce no effect upon the belly: In such cases, it becomes necessary to add a grain or two of sweet mercury, or some grains of rhubarb; but it is to be observed, that the same happy effects did not follow its use in this way, as when it was purgative without addition. The addition however of the purgative renders its use safe, and removes all danger of convulsions of the eyes, although neither *ol. rutæ*, *sabine*, or any other nervous substance, is given along with it. It is, in general, safer to give it in large doses than in small; for, from the latter more frequently the giddiness, dimness of the sight, and convulsions, &c. follow; whereas, from large doses, I have not known any other effect than its proving emetic or violently cathartic. To a child of two years of age, who had been taking ten grains of the root twice a-day, without having any other effect than making her dull and giddy, I prescribed 22 grains morning and evening, which purged her briskly, and brought away five large worms.

worms.' After some months an increased dose had the same good effects. I prefer the root to the other parts of the plant, of which, when properly dried, I give from 12 to 60 or 70 grains in substance. In infusion it may be given to the quantity of 2, 3, or 4 drachms twice a-day. I have found that, by keeping, the plant loses its virtue in part; for 40 grains of the root which has not been gathered above two months, will operate as strongly as sixty which has been kept for fifteen months.

### L E T T E R II. 1764.

THE longer I use the Indian Pink root, the clearer and more evident proofs I have of its excellent effects in worm-cases; in which it rarely fails, if the root is fresh.

### L E T T E R III. 1766.

THE anthelmintic virtues of the Indian Pink root are daily better known, and it is come into general practice both in town  
and

and country. It especially answers in continued or remitting low worm-fevers, in which I use its decoction, adding a small proportion of the root of the serpentaria Virgin. Its effects in abating the feverish exacerbations are so considerable, that in these I consider it as the most powerful sedative. It is an excellent attenuant. It keeps longer than I at first thought; for I have lately used it several years old, with great success.

*Singular Effects of the Indian Pink.*

A young lady, ten years of age, took some doses of the root, with a drop of the *ol. rute* in each, which did not purge her. Two days after the last dose, she was seized with a fullness and giddiness of the head, followed by a dimness of the sight. These continued for two days, when they abated a little; then there was observed a blueness round her eyes, which sometimes spread all over her cheeks and the  
sides

sides of her nose; and, after continuing an hour, would suddenly disappear, and again, after some time, return. This was her situation when my advice was asked. It was remarkable, that the discolouring of the *palpebræ* and cheeks immediately succeeded the giddiness and dimness of sight; and, *vice versa*, when her countenance became clear and of a natural colour, then she again felt the giddiness and dimness; and thus they alternately followed each other for some days.

It was easy, from the circumstances of the case, to guess at the cause; for, being informed, that the Pink-root had not purged her, and that no purgative had been joined with it, I prescribed a warm purgative to be given immediately, and to be repeated next morning, which operated gently; and from that time she was free of all her complaints.

DESCRIPTIO.

DESCRIPTION.

**RADIX** perennis, horizontalis, simplex, inæqualis, fibrillis plurimis, longis.

**CAULIS** simplex, erectus, teres, membranis quatuor e basi foliorum decurrentibus instructus ut quadrangularis videatur; scaber, annuus.

**FOLIA** ovato-lanceolata, acuminata, integerrima, nuda, glabra, venosa, sessilia, leviter decurrentia, opposita, patentia. *Par* infimum minimum, obverse cordatum.

**INFLORESCENTIA.** Spicæ secundæ, terminales, squamis parvulis ex opposito.

**CALYX** *Perianthium* pentaphyllum, foliolis linearibus, longis, subulatis, acutis, basi crassis, persistentibus.

**COROLLA** monopetala, tubulosa, decidua. Tubus calyce longior, inferne angustus, basi tamen ampliata, gibba, superne ventricosus, quinquangulatus,

latus, fauce iterum coarctata, *limbus* quinque partitus, *laciniis* lanceolatis, acutis, revolutis.

STAMINA *filamenta* quinque e fauce tubi corollâ breviora; *antheræ* oblongæ, sagittatæ, conniventes.

PISTILLUM germen superum, subrotundum. Stylus corolla longior, erectus, teres, villosus, infra medium articulatus; parte *superiore* decidua; *inferiore* coloratiore, calycis longitudine, persistente. Stigma simplex, attenuatum.

PERICARPIUM. *Capsula* didyma, scrotiformis, singula subrotunda, bivalvi, perpendiculariter dehiscente.

SEMINA plurima, scabra, angulata, externe convexa, receptaculo erecto, capitato, undique infidentia.

OBS. I. Calyx pentaphyllus, flos superus, stylus corolla longior, stigma attenuatum, structura pericarpium singularis, quominus ad Ioniceram sit referenda vetant.

2. Nonne calyx pentaphyllus, structura limbi et antherarum, stylus articulatus



Fig. 1.



ticulatus huic proprius a spigelia \* hanc separant.

*Explanation of the Plate.*

FIG. 1. The entire plant called the *Indian Pink*

2. *a*, the 5-leaved calyx, *b* the petal opened to show *c* the stamina, and *d* the stylus jointed at *e*.
3. A perpendicular section of the pericarpium to show its cavity, the seeds and their attachment.
4. The seeds with their receptacle.
5. Other views of the seeds.
6. The upper part of the stem in fruit, the style being broken over at the joint.
7. The pericarpium after it has opened naturally and discharged the seeds.

## A R T. XI.

*An Account of a very infectious Distemper prevailing in many Places, by FBENEZER GILCHRIST, M. D. \**

**M**ANY years ago †, a distemper appeared in this and some of the neighbouring counties, which, at first, gave no apprehension to those affected with it, of any thing more than a slight and common ailment; but was soon discovered to be of the venereal kind, or the *foul disease*. It has prevailed ever since, in a greater or less degree, at different periods, in different places; sometimes indeed abating both in strength and frequency; it seemed to be so much upon the decline,  
as

\* As this paper is to be published in a sheet, and dispersed among the lower class of people in this part of the country, where information is desired, it is written in a plain manner, and the terms are explained in words the most familiar to them.

† Read 1765.

as to give hopes that it would intirely cease. But, if at any time it lay unactive, and, in appearance, almost extinguished, it was only to break forth again with redoubled force, or some new and more aggravated circumstances. Great are the perplexity and distress, the suspicion and terror caused by it where-ever it comes ; and hitherto nothing has been able to prevent the spreading of it. As this is a matter of general concern, because every one is more or less in danger, and no particular notice has been taken of the disease, it was thought proper, in this public manner, to give some account of it in its various appearances, the progress it has made in these parts, and how it is propagated ; in order to shew by what means it is most likely to be subdued, and, if possible, exterminated. It is believed to have been brought into the low country from the highlands, where it prevails under the name of SIBBENS or SIVVENS ; and tradition has it, that it was first introduced into that part of the kingdom, in the time of Cromwell, by  
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the soldiers he put in garrison there. With us it is frequently, but improperly, called *the Yaws*; which is a very different malady. From a supposed difference of causes, some imagine, it is as improper to call it venereal. However, to express in some sort the nature of it, it is here classed with a disease, to which, if not the same, it has an exact resemblance, both in its symptoms and cure; and it is no less infectious.

1. IT first appeared here in the form of a sore throat, or an inflammation of the *uvula* or *pap of the hawse*, as it is termed, and neighbouring parts. The *tonsils*, or *almonds of the ears*, were often superficially ulcerated, appearing either raw, or covered with a white slough. Frequently there was a thrush, that is, *white specks and sloughs*, upon the roof of the mouth and inside of the cheeks and lips, which commonly shewed itself at the corners of the mouth, in a small ring of the skin, of a pearl or whey colour; where likewise a very small excrescence or *fleshy sprouting* like a rasp, often appeared,

appeared, which turns into a scab, and is a pretty sure sign of the disease, although there be no thrush or sore throat. Sometimes there was a hoarseness. The uvula has been destroyed by it. Children on the breast seized with it in the mouth and throat, perished for hunger, not being able to suck or swallow. In a few instances the submaxillary glands, or *kernels under the lower jaw*, have been considerably swelled.

2. ACQUIRING greater strength, and affecting more the habit, it appeared in the form of small pustules, or *blushes* of a dirty hue, which breaking left a dry crust, with blueness around, and ulcerated deep into the cellular membrane, or *fatty part below the skin*. Children mostly were the subjects of it in this form. These pustules chiefly occupied the belly, groins, and sides; sometimes they were seen on the face. The ulcers usually made but small progress; being, for the most part, no bigger than the top of one's finger or thumb; some long, some round, others irregular, and pretty clean, with  
slightly

slightly inflamed lips, or *edges*. In some instances however, running together, they spread to a great extent; so that all the fatty membrane of the belly below the navel, has been laid into one large foul ulcer, with such intolerable and peculiar stench, that those in this condition might be said to be rotten before they were dead. In some children the whole scalp has been in a mortified state, the ears ready to drop off. Smaller ulcers formed likewise on the breast and face, covered with a purulent or *mattery* slough, and always remained in a dead state, without pain or inflammation, and hardly ever growing larger.

3. STILL increasing in malignity, it assumed another appearance. Boils here and there, suppurating or *bealing*, formed ulcers in different parts, in the arms, shoulders, face, legs, and feet; and penetrated as far as the muscles or *fleshy parts*, leaving them quite bare, and seeming to eat superficially into them. They were of a high florid colour, without any matter to defend them, except a little ichor,

or

or *watery humour*, which made them exquisitely painful, and so tender, that scarcely would they bear the mildest application. The lips were hard and ragged. Some of them were very large others but small; and, viewed singly, might easily have been mistaken for real cancers; but the number of them, sometimes the manner of their coming on, and other circumstances, soon determined to what kind of disease they belonged.

4. IT has been known, though rarely, to affect the bones, but never, with us, the large and more solid ones. Several have lost teeth with the sockets; and some of the bones of the cheeks and nose have come away. A portion of the *ala nasi*, or *gristly part of the nose*, has been destroyed by it.

5. WHEN it affected the skin only, penetrating no deeper, or very little it appeared in various shapes. The whole surface of the body has been observed mottled or *flecked*, of a dusky copper colour, or dirty red, as the discolourings of the skin in this disease commonly are.

Infants

Infants of the month have had a redness in the lower part of the belly, buttocks, thighs, and part of the legs, where sometimes it terminates abruptly in a ring, and has been suspected for the disease. In some of these there was an inflammation, and watery shining swelling of the pudenda, or *natural parts*. A more certain appearance in such subjects somewhat older are broad red patches, as large as the palm of the hand, over all the trunk, as well as limbs, attended with inflammation. A cluster, or clusters, of small pustules come out; the skin grows dry and peels off, leaving a new tender skin beneath; and this will happen a great many times, sometimes in one place, sometimes in another. Scabby eruptions were often met with on the scalp, forehead, inside of the thighs, groins, and parts contiguous; where frequently small hardnesses just within the skin, caused very troublesome itching. Inflammation, sorenesses, and excrescences about the fundament were frequent. It has appeared too on the breast, shoulders, and  
 elsewhere,

elsewhere, as a *herpes exedens*, or *eating tetter*; healing in one part while it broke out in another adjoining, and leaving great deformity of the skin. Of late, some have been seen with tubercles, or *little hard knots*, upon the face, pretty numerous, in figure and size resembling small-pox at the height, but of a reddish colour. They are attended with great heat and tumor, so as sometimes to shut up the eyes. One had them spread thick over the whole body with matter, as in the confluent small-pox, and died when the swelling began to subside. In others, when not so numerous, they gradually decay without coming to matter. Some have the tumor without tubercles; the scarf-skin throwing off, from time to time, in fine, white, net-like flakes, as soon as renewed. From small bright red spots, tubercles, redder than those just mentioned, are produced. These run together in some places, and form a flat smooth rising, which now becomes of the usual colour of the skin, and may slightly ulcerate. It shews itself likewise in a

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foulness of the face of different kinds ; sometimes with the same sort of eruption over all the body.

THERE are other appearances and circumstances not so necessary to be known, as they may be thought too minute, or do not so generally occur, and therefore are omitted. One great symptom, however, must not be passed over, which, though it has never been observed here, is common enough in other places.

6. AN itchy tetter, or ringworm, breaks out in a round form, which, by scratching, or of itself, turns raw, and does not scab, but oozes an ichorous humour. In a short time a fungus, or *spongy substance*, sprouts up, much like a rasp or a strawberry, elevated one half above the surface, and, when fully formed, appears as if set in a socket cut in the flesh exactly to receive it.

BUT sometimes the sore is crusted over with a black scab, except at the edges, where there is a crack or ring; like the line of separation between a mortified and a sound part ; from which the same  
sort

fort of humour is constantly drilling. By degrees the crack enlarges towards the middle, and the scab, pushed off, gives place to the fungus just now described. At other times the spungy excrescences succeed a dark or grey scurf, resembling some kind of leprosy. The parts are very itchy, and, when made raw by scratching or otherwise, the flesh is allowed to sprout.

THESE sores occupy every part of the body, and many of them are seen in the same subject at the same time. But the excrescences do not always happen, and seem to be more frequently produced in the sore that never scabs, than in the scabby or scaley ones. They are rather indolent than tender to the touch; and their colour is not remarkably different from that of the fungus of other sores. From this berry-like rising in the venereal sore, the disease is said to be denominated the SIVVENS; *Sivven*, in the highlands, being a common name for a *wild rasp*.

HITHERTO the disease has been confined to the lower ranks. Some, however, of good condition have lost children by it; and, if great care is not taken, it may find a way into the best families. The young and the full grown are equally the subjects of this infection. Those of more advanced years seem less liable to be infected. The sex, from their tender frame, and children, for the same reason, are most susceptible of it.

IT is propagated by using the same spoons and knives, and wiping with the same cloth, the infected have used, without cleansing or washing them; drinking out of the same glass or cup; smoking with the same pipe; sleeping with the infected, or in the same bed cloaths they have lain in; and handling their sores; by sucking or giving suck; saluting or kissing; and fondling children, or feeding them in an uncleanly way. Nor is it unlikely, that, in certain circumstances, the breath may become infectious.

A proof that the disease is propagated chiefly by the want of cleanliness, is,  
that

that it has never got footing among those of better fashion, nor in towns, where, except with the very lowest, greater cleanliness generally takes place. Upon inquiry too, no certain appearances of it are discovered in those places nearest to us of the neighbouring kingdom, so justly celebrated for cleanliness. Another proof is, that sometimes it is observed to become more frequent after autumn. A company of reapers is made up of very different people, brought together from all parts. They eat and drink promiscuously out of the same cups and dishes; and a few spoons are made to serve a good many by putting them round from one to another. The same is done with a pipe in smoking. When the body is warm, and the pores open, the tender skin of the lips and mouth is most disposed to receive the infection, which the heat in labouring will render more active and apt to be communicated. A girl who had the thrush to a great degree, at this season, spread the disease through a whole

whole parish where it was not formerly known.

THE foregoing description of the distemper is so plain, that no body of common discernment can be at a loss to know it. The ways by which it is communicated are likewise so obvious, that the methods of prevention must be so too. As prevention is the principal thing in view, a few hints shall be suggested in relation to it. These duly attended to, may, in time, go a great way to extinguish the disease.

ALL masters and mistresses of families should be very attentive whom they receive into their houses as servants. Let them be sure that such are neither infected, nor have had any communication with infected persons or places. It belongs to them, moreover, in their families, to enjoin the most cleanly methods of doing, to set an example themselves, and to see that their injunctions be strictly observed.

SERVANTS, on the other hand, as their bread and characters depend upon it, ought.

ought in all respects to recommend themselves by their cleanliness; avoiding carefully, at the same time, all intercourse with persons and places where there is the smallest danger of infection. Any servant that comes into, or remains in a family, having the distemper and knowing it, must be deemed guilty of a crime, as the consequence may be highly injurious, and even fatal to others.

THOSE employed in harvest-work, making hay, or preparing fuel, and all labourers eating and drinking in companies, should be obliged to bring along with them every one a knife, a spoon, a dish, a cup, and a cloth to wipe with. Instead of eating all out of one dish, or drinking out of the same cup, they ought to be helped in a decent cleanly manner, into cups and dishes of their own. Let nobody smok with a pipe that has been used by another.

SUCH as keep public-houses are, in a special manner, bound to observe the greatest cleanliness, both as a matter of prudence and justice. It is expected of them,

them, that they are never to offer to one what has been used by another in eating, drinking, or otherwise, till it is thoroughly cleaned again. And in drinking-companies, every one should have his own glass. A gentleman obliged to do business in a low house, by drinking out of the same cup with others, caught the infection, and had almost been ruined before he knew what the disease was.

THE disagreeable custom of lying two in one bed should be altogether banished, unless the persons are well known to each other.

THOSE who put out their children to nurse, cannot be too nice in inquiring into the character and cleanliness of the persons to whom they are intrusted, and the condition of the place where they live with respect to the disease.

THE very uncleanly method of feeding children, so common among the meaner sort, ought instantly to be forsaken, as it is a likely way of communicating the infection, and more suited to the  
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fordid condition of mere barbarism, than the manners of a civilized people.

FROM perpetual custom, every one claims a right to kiss and fondle a child. Nurses, and all who have the charge of bringing up children, must be extremely cautious whom they admit to this familiarity, and positive never to allow it to strangers, especially of low rank; who, to procure favour, are often forward to shew, this way, an affected fondness.

MUCH more might be said with regard to cleanliness, and equally necessary to be observed, which will readily occur to those who have any taste for it, or a sense of the danger to which, by the neglect of it, they are exposed.

MANY, through fear of shame, and a criminal modesty, by concealing the malady, have suffered it to go a great length, to their own disquiet, and the endangering of others. In a lower degree, it may lurk in the body a long time harmless, till, strengthened by time and accidents, it becomes powerful enough to infect, even before there are any certain appear-

ances, or fufpicion of its exiftence. This hath often been the occafion of much furprife, as well as uneafinefs, both to particulars, and in families.

WHENEVER, therefore, any figns of it are difcovered, thofe who are fo unfortunate as to have received the infection, if they regard their own fafety, or the fafety of others, are earneftly advised to apply, without lofs of time, to the proper hands for a cure. In milder cafes, a few dofes of mercurial phyfic, and fome external applications of the fame nature, may fo far weaken the fymptoms, as to promife a cure; and, if the infection has not got beyond the lips, poffibly may deftroy it. But, for the moft part, the diftemper, fooner or later, returns, with greater force perhaps, or in a worfe form. Experience fhews, that it is proof againft all fuch flight adminiftrations; and not to be eradicated but by a regular courfe of medicine, judiciously adapted to the feveral degrees and circumftances of it.

THE method of cure differs nothing from that commonly practised in venereal cases. Mercury, given a longer or shorter time, seldom fails to remove the distemper. High salivation is not needful. Large doses of this remedy, and much spitting, unnecessarily fatigue and exhaust the patient. If the mouth is sore and watery, and kept at this pitch a proper time, a proper quantity of the mercury being thrown in, it is sufficient. Under such a management of it, the sick may live in a cooler way; because much warmth is always hurtful.

IN higher degrees of the distemper, indeed, the remedy must be given in greater quantity, or continued longer, to have an adequate effect, that is, to produce a free salivation; and, even after that, some symptoms may remain.

THESE are to be carried off by time, in the use of the Æthiopic pill, sarsaparilla, and the like. Such as cannot afford the sarsaparilla, may use a decoction of the woods, or that of bardana; which last is very fit to be drank during the course

course of the mercury. The remains of a fore throat, and other external ills requiring it, yield to a fumigation of cinabar cautiously employed. The affections purely of the skin were treated with mercurial ointments and water.

To younger children, the *mercurius alcalifatus* was given once or twice a day, according to age, and other circumstances; purging now and then to divert it from the mouth, if it had a tendency that way. The *sarsaparilla* likewise was directed to these, if they would take it; and the *unguentum citrinum* to be rubbed upon scabs, excrescencies, or any foul sore.

THE solution of the corrosive sublimate has often been tried, allowing the patient to go abroad, but not with the desired effect. Among the lower people, it is hardly possible to prevent irregularities, and keep them to a method, without absolute confinement. When they submitted to this, calomel was always used, and sometimes the unction along with it. The sublimate, however,  
 may

may be useful to subdue the remains of the disease, and as an external application.

MERCURY, if possible, ought never to be administered, but under the immediate inspection of a person of skill; because the patient, by his own mismanagement, may bring himself into danger; or, upon a slight amendment, give over the course before the cure is perfected; and an imperfect cure gives afterwards a great deal of trouble. All the symptoms appearing again, another course of the medicine becomes necessary; but now it will not have such a certain and speedy effect, as the body has been accustomed to the use of it.

SOME very unaccountable notions have been held concerning this malady, and practices indulged, of which every one should be apprised and aware, as they have a manifest tendency to propagate the distemper, and greatly increase the malignity of it. It is imagined, that the disease cannot be so easily and completely cured as when it appears in the form of scabs, sores, eruptions, and the like  
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disorders ; for, by such methods, say they, nature throws out the matter of the disease ; which, upon this presumption, is neglected in its milder states, and allowed to run on to a more dangerous height. It is imagined farther, that one may get rid of it by giving it to another ; and that its vigour decreases in proportion to the number of persons through whom it passes. But, which is still worse, because highly criminal in conduct, the infected often finding themselves unjustly reproached, avoided, and perhaps forsaken, are exasperated, and enjoy a malicious pleasure when they can involve others in the same calamity. Nothing surely can be more foolish, absurd, and wicked.

WHEN we consider the nature of it, the disagreeable circumstances that attend it, the many ways it may be communicated, how contagious it is, and difficult sometimes to subdue, a disease of such a kind is justly, no doubt, to be dreaded. Innocent sufferers, however, wretched enough already, should not be made more so ; and, from an undue solicitude for

for ourselves, or an hard opinion of them, denied the common offices of humanity. On the contrary, those concerned ought tenderly to afford them the assistance of which they stand so much in need, in order to alleviate their distress, and bring it sooner to an end, which may be done without any danger. A little attention in point of cleanliness, as experience proves, will be a security against it. Were such a conduct always observed toward them, many, who now industriously conceal it, would readily discover their misfortune, and seek a cure, which, with kindly sympathy, every one should be encouraged to do. By this means the number of infected would daily diminish, and much infection be prevented.

A very hurtful practice has obtained with some. Vitriol, and other drying things, are applied to rawnesses, scabs, tetter, and excrescencies; by which, indeed, they may frequently be healed. But the matter thus repelled, and mixed with the humors, will cause great disturbance

disturbance in the body, or break out again some where else, in another shape, and with more violence. One having a slight rawness of a finger, handled an infectious sore, not knowing it to be so. The part put on a bad appearance. Great pains were taken to heal it, but the consequence was a sore throat, hoarseness, tumor, and ulcerations. This has happened to others from the same cause.

THE information now given is written at the desire of some who are much affected with the unhappy situation of the people in many places; and with a design, that all being acquainted of the danger, may heartily unite their endeavours to put a stop to the progress of so grievous a malady; and at the same time so disgraceful, as nastiness is the chief cause of its continuance and increase. The infected, except in higher cases, are, by a proper method, easily cured. Prevention, however, is the sure way to extirpate the distemper; and nothing

thing else can avail. It is greatly to be wished therefore, that the present and very pressing necessity may be a speedy means of promoting a more general system of cleanliness among those of certain stations who are well known to be deficient in this matter, and effectually prompt them to it: Their peace and safety, their interest and reputation, and the public welfare, are all connected with it. But, if the cautions and advice here offered, with the most friendly intention, shall notwithstanding be overlooked, or totally disregarded, miserable must be the condition of many! Still gaining strength, the disease will take deeper root in the constitution; grow obstinate to remedies; diffuse itself more universally; and really become, or get possession so early as to appear, hereditary. It will continue the plague of this generation, and be transmitted, with every circumstance of virulence, to posterity.

## ART. XII.

*Cases of Aneurisms, with Remarks, by Dr  
DONALD MONRO, Physician to St  
George's Hospital, London\*.*

## CASE I.

*London, August 1. 1760.*

**J**OHNS PARKER, in the fortieth year of his age, about five feet ten inches high, of a strong muscular but thin make, a pump-maker by trade, who had always been accustomed to hard labour, and to work in deep wells, and other places below ground, and to drink freely (tho' not to be intoxicated) of porter, but of no other strong or fermented liquor, about twenty years ago received a venereal infection, and had a bubo in the  
left

\* Read 1760, and following years.

left groin, which was cured by being brought to suppuration, and opened; after which he married, had several children, and neither he nor his wife had any symptom of the venereal disorder.

SOME time in summer 1759, he received a blow in the left groin, with the end of a pick-ax; and soon after perceived a swelling in that part, which proved to be a rupture. About Michaelmas it came down, which he at first neglecting, it inflamed so violently, and put him to so much pain, that he sent for Mr Arnaud the surgeon; who, after bleeding him, and ordering him a clyster, finding it impossible to reduce the rupture, performed the operation for the bubonocoele. In the hernial sac, he found part of the small guts and omentum greatly inflamed, and so black, that he was afraid a mortification had already begun; however, he reduced them both, after having cut away part of the omentum.

AFTER this, the cure went on extremely well without any accident; the patient was blooded a second time, some days after

after the operation, and kept upon low diet, to prevent any danger from inflammation; and as he lay in bed, kept his thigh bended towards his body, and his leg towards his thigh, being the posture in which he found himself most at ease.

IN November, when the wound was almost skinned over, a small tumour in the ham of the same side was perceived, and shewed to Mr Arnaud; who, at first, imagined it to be a slight swelling of the small glands, from the position which the leg had been kept in during the cure of the rupture; and therefore ordered only a liniment to rub it with.

ABOUT Christmas, the patient observed another tumour in the right ham, and that both had a strong pulsation, which alarmed him a good deal; and he sent again for Mr Arnaud, who, upon examining them, immediately discovered them to be aneurisms; and attempted by bleeding, the application of astringent fomentations, and proper compresses and bandages,

dages, to prevent their further growth; but without any effect.

IN January 1760, another tumour of the same kind appeared in the right groin; and, in the month of February, another smaller one about the middle of the same thigh\*.

ON Wednesday the 19th of March, John Parker offered himself as a patient at St. George's Hospital, was admitted, and came under my care. At this time, the tumour in the left ham had a very strong pulsation, with the feel and appearance of a circumscribed tumour, of the size of a large hen's egg; but occasioned no swelling of the neighbouring parts, and gave him no pain. That in the right ham had neither the appearance nor feel of a circumscribed tumour, but looked and felt like a large swelling of the whole ham and knee, and had still an evident pulsation; it kept him in perpetual pain and uneasiness, and occasioned an oedematous

\* The above account I had repeated times afterwards from the patient himself and his friends, during the course of his illness.

matous swelling of that leg. The swelling in the right groin was about the size of a small hen's egg; but that in the middle of the thigh was about the size of a pigeon's, and could only be felt when one pressed the thigh at the part where the artery is about to sink deep among the muscles of the inside of the thigh; both these had a strong pulsation, and the feel of circumscribed tumours, but gave no pain.

As this was an extraordinary case, the advice of all the physicians and surgeons belonging to the hospital was asked, who all agreed that it was a lost case; and that all that could be done, was to endeavour to alleviate the patient's misery by a mild cooling regimen, and the occasional use of opiates. Accordingly, from this time till his death, the only medicines he took were a little lenitive electuary to prevent costiveness, which always increased his pain, and some of the *tinctura thebacia*, or of the *pilulae saponaceae*, *Ph. Lond.* when the pain was severe.

ON the 2d of April, he went home; but was an out patient of the hospital till he died; and I visited him once a week, or oftener, as it gave him satisfaction, and I was desirous of seeing the progress of the disorder. He continued the use of the medicines already mentioned; and used no other remedies, excepting that, when he was in great pain, he rubbed the right ham with sweet oil, or some soft liniment, which he thought gave him a little present ease.

FROM the time of his first coming to the hospital, the swelling in the right ham and knee gradually increased, and the pulsation as gradually diminished, so that at last it could not be perceived. About the end of April, the swelling was increased to a prodigious size, attended with excruciating pain: The integuments began to rise into a point in the middle, and afterwards gradually grew thinner, and more inflamed, till the 8th of June, when the blood began to ooze through the skin: Upon which one  
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of Petit's tournequets was put loose on the thigh above the tumour; and the patient was desired to turn the screw, if the tumour should happen to burst and bleed. The other aneurisms all this time gave no uneasiness; at least, the violence of the pain in this made him less sensible of any from the others; and they remained nearly of the same size, excepting that the one in the left ham seemed rather to have increased.

ON Saturday the 14th, in the afternoon, the tumour burst; and, before he could turn the screw of the tournequet sufficiently, he lost a great quantity of blood, which reduced him very low, and he became faint and sick, with an inclination to vomit. On Sunday, in the morning, I found him very low, with the same sickness and inclination to vomit, which he had had the day before. He complained, that, since the tournequet had been screwed tight, the tumour in the groin had begun to enlarge, and to have a stronger pulsation; and he told me,  
that,

that, from what he observed, and from the symptoms he felt, he thought he had not long to live, and begged to have some remedy that would alleviate the violent sickness that oppressed him. I ordered him a mixture made of simple mint-water, and spirituous cinnamon-water, with a little of the *tinctura thebaica*, and syrup, to be taken by spoonsfull. After this, he sunk fast, by the bleeding from the ham, whenever he relaxed the tourniquet, and the symptoms of a mortification of the right ham appeared on Monday. On Tuesday in the afternoon he died. The people about him alledged that he lost five quarts of blood from the time of the bursting of the tumour till his death.

To give an idea of the external appearance and situation of these aneurismal tumours, I obtained the favour of Mr Lens to draw two small figures, representing them in their natural situation, from my description, having had no opportunity of getting them done, either during

the patient's illness, or from the body after death. See tab. 1. fig. 7. & 8.

ON Wednesday, in the afternoon, his body was opened by Mr Arnaud, in presence of several other gentlemen and myself. The abdominal and thoracic viscera were all in a sound state; the heart was small, the liver had a few black spots on its surface, but did not seem otherwise diseased. The aorta, the iliacs, and all the other arteries within the thorax and abdomen, seemed to be in a sound state, and had no perceptible dilatation.

THE crural artery of the right side, about a quarter of an inch below where the epigastric artery goes off, was dilated, and the dilatation continued down for  $2\frac{3}{4}$  inches; it was covered with numerous inguinal glands, swelled to the size of very small beans, which had made this aneurismal sac appear to be larger before death than it was found on dissection to be, after these glands were separated; when distended with air, it had much the appearance of an egg, and resembled exactly

ly fig. 1. & 2. No. 1.\*; from the lower part of it the large muscular branch of the femoral artery was sent off.

BELOW this, the artery returned to its natural size, and continued so for above  $2\frac{1}{4}$  inches, and then began to be again dilated into another oval sac, (represented by fig. 1. & 2. No. 2.) of near two inches long: This was the aneurism which was to be felt by pressing the thigh at the part just above where the crural artery begins to sink down among the muscles on the inside of the thigh.

THE artery then assumed its natural form and size for an inch and a half; but afterwards was dilated into the small sac, represented by fig. 1. & 2. No. 3. which had not been observed during the patient's life.

AFTER this, it returned to its natural size, and continued in this form for  $3\frac{1}{2}$  inches, and then opened in the lower part of the ham into the large sac, the  
burst-

\* The figures of the arteries and aneurifinal sacs were done by Mr Lens from the parts themselves, some days after they were taken out of the body.

bursting of which had been the immediate cause of the patient's death. An inch and  $\frac{3}{4}$  below its opening into the sac, it resumed its natural form and capacity before it was distributed to the leg. This cyst, when entire, was capable of holding two or three pints of liquor; it was filled with fluid and grumous blood mixed, and with a large polypous concretion, such as is commonly found in large aneurisms; part of the sides of the cyst was wore away where it lay contiguous to the lower part of the *os femoris*, and head of the tibia; for, a finger being introduced into the posterior orifice, these bones were felt rough and carious; a small part of this sac, with the opening of the crural artery into it at (A.) and its exit from it at (B.) to be distributed to the leg, is represented in fig. 1. & 2. No. 4.

THE crural artery of the left side, a little below the groin, was dilated to about the size of a small bird's egg; but, this part of the artery having been left by mistake in the body, no figure was  
drawn

drawn from it; we had only observed it about two days before the patient's death.

THERE was no other aneurism observed in this crural artery, till it reached the ham, where it was dilated backwards into a pouch, capable of holding six or eight ounces of liquor, of which fig. 3. is a side view; this was the first tumour that had appeared, and was filled with fluid and grumous blood, and firm polypous concretions, which are represented in fig. 4. D.

THIS much was observed at the opening of the body; but, having afterwards got from Mr Arnaud the crural artery of the right side with its four aneurismal sacs, and the aneurismal sac of the left ham, I separated the different coats of this last mentioned sac where it had been slit open on the fore part, and, in tracing them, found them continued with those of the artery. I first dissected away the loose cellular membrane (see fig. 5. & 6. EE.) which connects the arteries with  
the

the furrounding parts \*, by which we had a view of the membrano-cellular coat † (see fig. 5. & 6. FF.) lying immediately below ; and then raised this membrano-cellular coat from that called muscular ‡, (see fig. 6. GG.) which was every where lined with the fine villous coat ||.

I would have dissected all the other aneurismal sacs ; but, my brother being desirous

\* This loose cellular substance, when separated from the other parts, collapses into the form of a membrane, and has very improperly been reckoned by many authors one of the coats of the arteries.

† This coat was demonstrated near thirty years ago, by my Father, to be composed of a dense cellular substance. See Med. Essay. vol. 2. 1733. It has been called tendinous by Heister, and *ligamento-elastica* by Nichols, and *cellulosa propria* by Haller.

‡ This coat, composed of reddish, circular, and flesh-like fibres, has been called muscular by most anatomists ; they who call it white tendinous, seem either to have mistaken the former for it, or to have raised the two together.

|| This most internal coat is dense and smooth, it has been called by some nervous, by others villous.

Besides these, there are two fine cellular coats, 1. One which connects the membrano-cellular with the muscular. 2. Another which joins the muscular with the nervous or villous.

firous to have them, to make an anatomical preparation, I proceeded no further, lest I should spoil them for his purpose.

WHEN I sent them to Edinburgh, I begged the favour of my father and brother to give me a particular account of what further observations they should make in examining them, and have since received the following from my father.

“THE aneurismal sacs you sent to E-  
 “dinburgh were dissected by your bro-  
 “ther, in my presence; the appearances  
 “were the following. The external loose  
 “cellular, and the cellulo-membranous  
 “coats being dissected away carefully, the  
 “circular fibrous, commonly called mus-  
 “cular, coat, was evidently seen continu-  
 “ed on all the three small sacs in every  
 “part of them, as in fig. 9. BB. but was  
 “thicker there than in the sound part of the  
 “artery; and, in the most enlarged part of  
 “the sacs, an extraneous substance, resem-  
 “bling a soft steatomatous matter, was  
 “in-

“ intermixed with the muscular fibres:  
 “ The cellular substance lining the inside  
 “ of the muscular coat, was considerably  
 “ thicker than natural, and had much  
 “ the same appearance of an extraneous  
 “ substance filling its cells. The inter-  
 “ nal membrane of the artery adhered so  
 “ firmly to these cells, that it could not be  
 “ separated, but seemed thicker than in a  
 “ sound state. Though the circular fibres  
 “ could be observed at the sides of the in-  
 “ cision made into the forepart of the  
 “ sac of the left ham, as represented in  
 “ your figure; yet, as the dissection was  
 “ continued backwards towards the most  
 “ distended part, these muscular fibres  
 “ became less observable, and could not  
 “ be traced. Whether this apparent de-  
 “ fect of them here was owing to a much  
 “ greater proportion of the extraneous  
 “ substance above mentioned, or to their  
 “ having been destroyed by the great disten-  
 “ sion, is difficult to determine. The in-  
 “ ternal cellular coat of this sac was con-  
 “ siderably thicker than in the smaller  
 “ ones,

“ones, but of the same texture. The  
 “most internal membrane was in a  
 “thickened adhering state. In the part  
 “of the great sac of the right ham which  
 “came to Edinburgh, no circular fibres  
 “could be seen, and the structure was o-  
 “therwise much the same as that now de-  
 “scribed of the back part of the sac in the  
 “left ham.”

*Explication of Table First.*

FIGURE I. A back view of the crural  
 artery of the right side, from the groin  
 till below the ham, of the natural  
 size. No. 1. The aneurism in the groin.  
 x. A vein lying at its side; y. a large  
 artery going off from the bottom of  
 it. No. 2. The aneurism in the thigh  
 at the part where the artery is about to  
 sink down among the muscles. No. 3.  
 One lower down that was not known of  
 till the dissection. No. 4. Part of the  
 cyst of the large one in the ham which

burst. A. The upper orifice of the artery opening into it. B. The orifice going out at the lower part to the artery of the leg C.

FIG. 2. A front view of the same, to shew the rise of the epigastric artery R.

FIG. 3. A side view of the one in the left ham, which was entire in the living body, and opened in the dissection on the fore part.

FIG. 4. View of the same opened on the fore part, with the polypous concretion D. at the bottom of the sac.

FIG. 5. A side view of the same, with the outer cellular coat EE. continued from the artery, and laid aside to shew the membranous one FF. below.

FIG. 6. View of the same, to shew part of the muscular coat GG. when the membranous FF. is laid aside.

FIG. 7. & 8. Two small views of the lower part of the trunk and thigh, to shew the situation of the aneurism in the groin, and of the two of the hams which were seen while the man was alive. H. The one in  
the

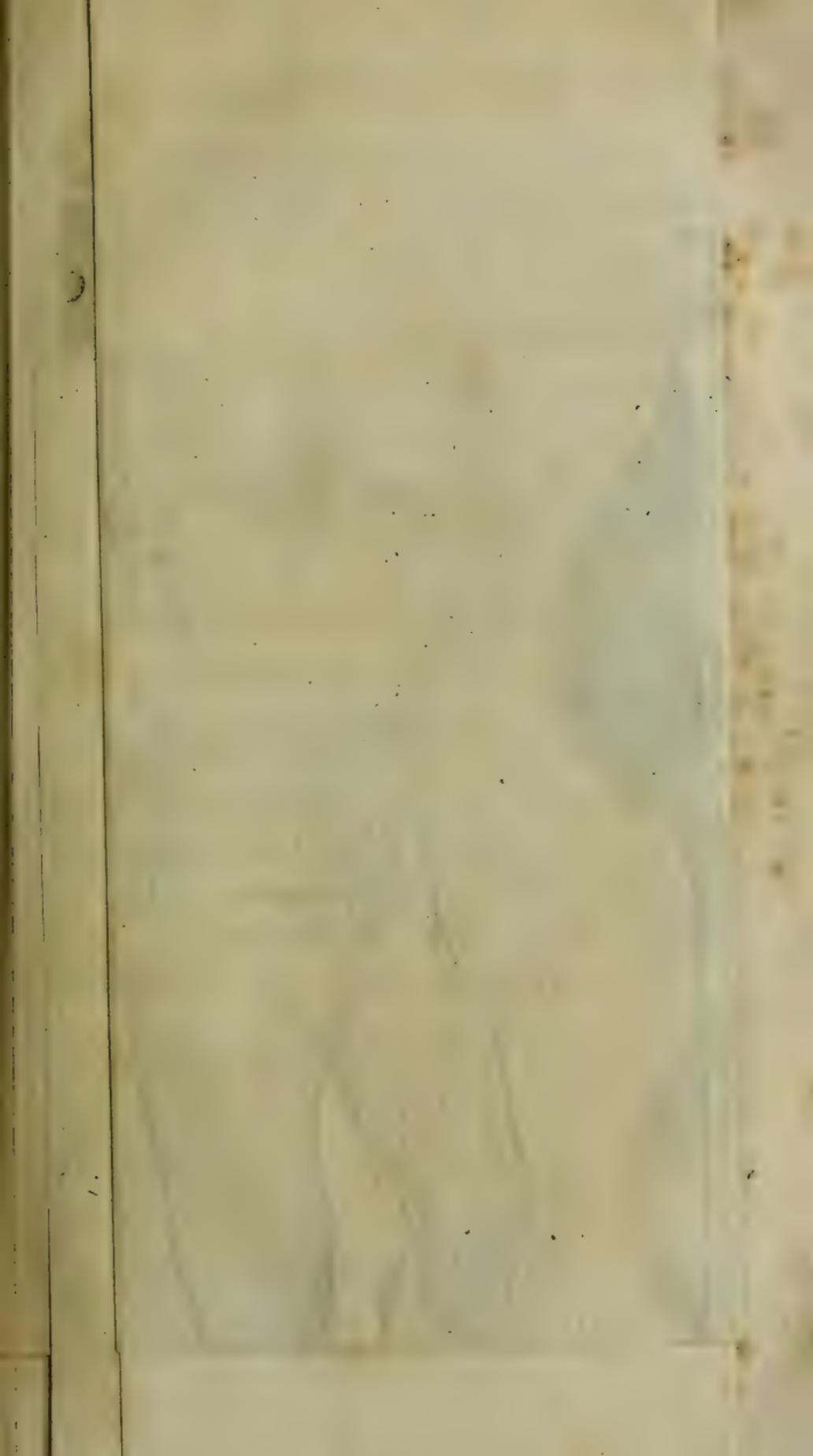
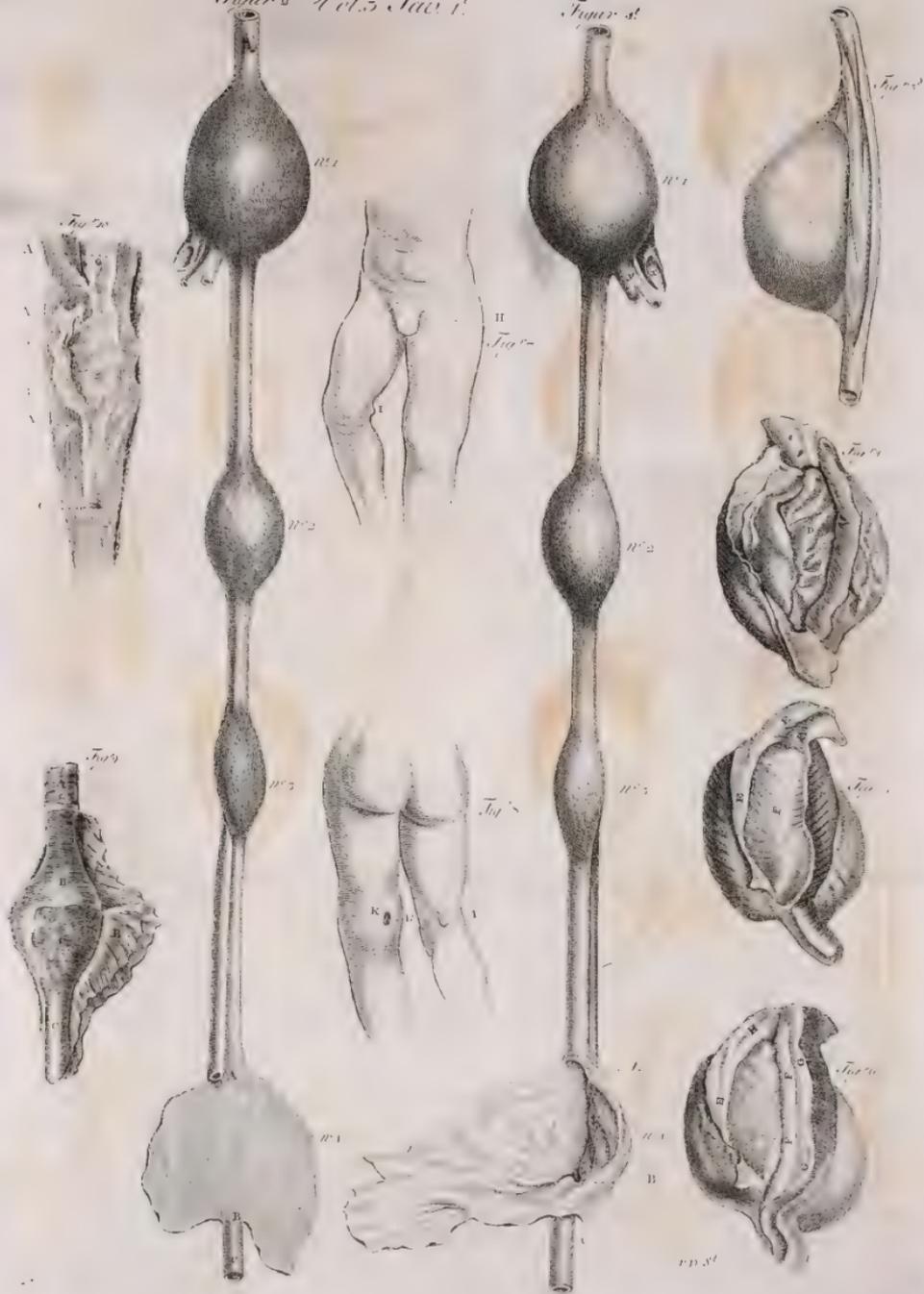


Figure 2. Vol. 5. Tab. 1.

Figure 3.



the groin. I. The one in the left ham. K. One in the right; and L. The orifice where the sac burst.

FIG. 9 Shews the membranous, muscular, and internal coats of the aneurism marked No. 2. in fig. 1. & 2. carefully dissected, and distinguished by the letters AA, BB. and CC.

## C A S E II.

THOMAS COOK, a soldier of the third regiment of foot-guards, some time in the beginning of the year 1759, perceived a swelling in his left armpit, for which he could assign no cause, having received no blow or bruise on that part, nor having been sensible of having overstrained himself in any manner.

THIS he immediately shewed to Mr Fordyce surgeon to the regiment, who discovered it to be an aneurism. The swelling gradually increased till the month of October, when, Mr Fordyce declining to attempt any operation,  
the

the patient brought a recommendatory letter to St George's Hospital, and was taken into the house on the 20th of that month. At this time the tumour was large, and extended itself far down the arm; it had still a pulsation, and the pulse at the wrist was feeble and weak. The physicians and surgeons of the hospital, upon examining the case, were of the same opinion with Mr Fordyce; they thought the tumour was situated too high up to attempt any operation, and advised only mild palliatives and anodynes to be given. After this the swelling gradually increased, and its pulsation as gradually diminished, so that at last only a tremulous motion could be observed in it; the pulse at the wrist grew daily weaker, and at last ceased entirely. In the end of November, or the beginning of December, the tumour began to rise in the middle, and at last bursting on the 29th of December, the patient died immediately of a profuse haemorrhage.

NEXT day the body was opened in presence of all the physicians and surgeons  
of

of the hospital. The axillary artery was found to open into the large aneurismal sac, which extended above two thirds down the arm. This sac was filled with a large lamellated polypous concretion, entirely of the same nature as those generally found in large aneurisms of long standing; and along with it a quantity of fluid and grumous blood. The beginning of the sac seemed to be continued with the coats of the artery, but the rest of it to be formed of the neighbouring cellular membranes, &c. in the same manner as the sides of any common incysted tumour. The humeral artery run behind the aneurismal sac, but was impervious for about half an inch, immediately below where the axillary artery opened into the large sac, its sides being grown together, as we found by making a hole into the artery below, and introducing a probe upwards, and then cutting open the vessel upon the probe till we came to the part where it was stopped. The rest of the humeral artery, and the radial and ulnar arteries

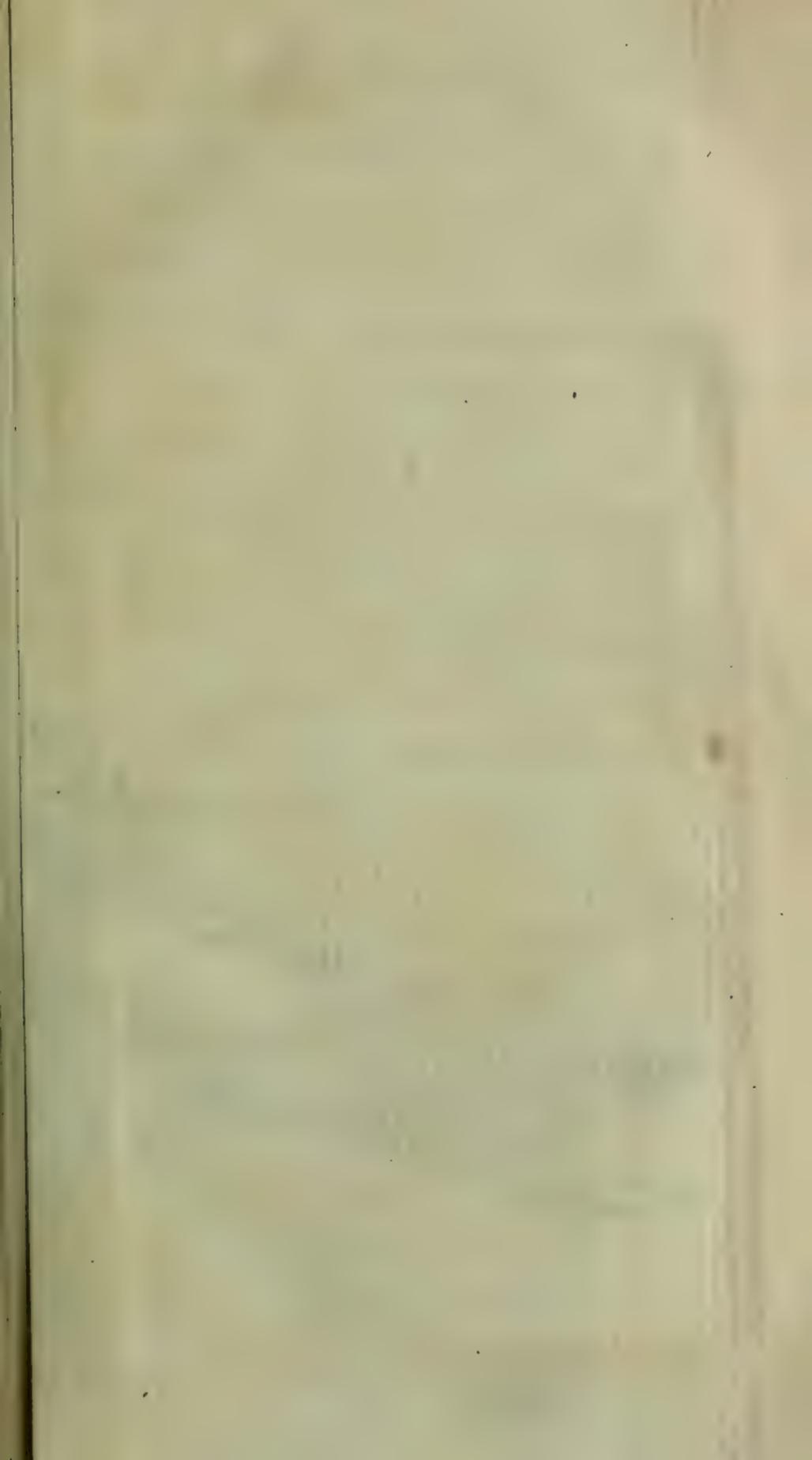
were

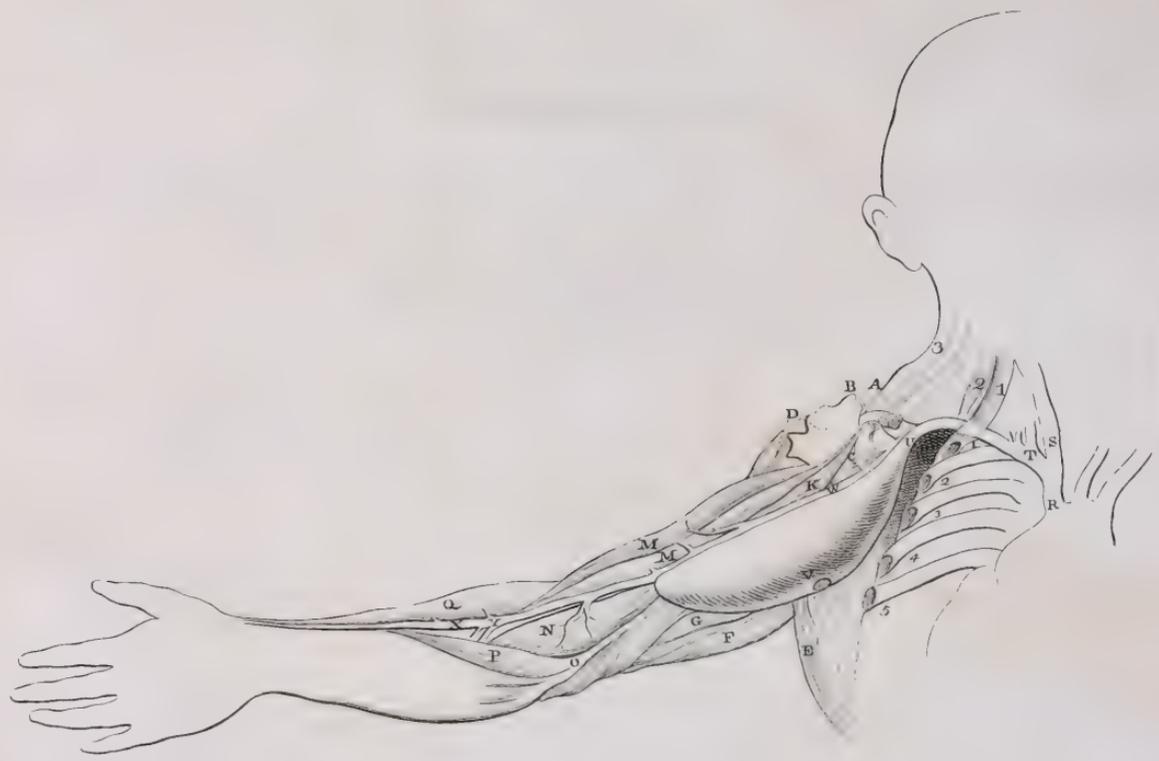
were still open, but much smaller than they commonly are in adult subjects, where the vessels are all free. The heart, the aorta, and subclavian arteries, were all of their natural size; and the left axillary artery did not seem to be dilated, till it was just about to open into the large sac. No drawing having been made from the body, I have sent you an out-line done from memory, upon one of Dr Haller's tables as a ground-work, which perhaps may serve better to explain the nature of this aneurism than any description I can give.

*Table Second.*

1. 2. The first and second Scalenus.
3. The Trapezius.
  - A. the Clavicle cut.
  - B. The Coracoid Process.
  - C. The lesser Pectoral muscle.
  - D. The Deltoid.

E. La-





E. Latissimus Dorsi.

F G H. Triceps Extensor Cubiti.

K. Coracobrachialis.

MM. Biceps Flexor Cubiti.

N. Brachialis Flexor Cubiti.

O. Internal Condyle of Humerus.

P. Pronator Radii teres.

Q. Supinator Radii longus.

1, 2, 3, 4, 5. Five uppermost Ribs cut.

R. The Trunk which produces S. the Right Carotid, and T. The Right Subclavian Artery.

U. The top of the Aneurismal Sac, behind which the sides of the Artery had grown together.

V. The Place at which the aneurismal Sac burst.

W. The Trunk of the Humeral Artery pervious from U. downwards.

X Y. The division of the Humeral Artery into the Radial and Ulnar Arteries.

CASE

## C A S E    III.

*The Case of a Gentleman, who, after recovering of the Gravel and an Haemoptoe, died of an Aneurism of the Aorta, by Sir JOHN PRINGLE, Baronet, M. D. Physician to her Majesty, F. R. S. and Fellow of the Royal College of Physicians at Edinburgh.*

AN officer of distinction, in the forty-first year of his age, received a wound at the battle of Fountenoy, 1745; and, from the long confinement to his bed, on that occasion, became first subject to the gravel, with which he was afflicted for some years after. During that time, he had several nephritic paroxysms, attended with sickness and vomiting, and a discharge of sand, sometimes of small calculi of a rough surface, from the left kidney.

IN the month of March 1751, this gentleman was seized with a vomiting and spit-

spitting of blood ; of this he had several returns, but got quite free of the disorder by the end of autumn, after having been two or three months at Bristol. It was doubtful whether the chief part of the cure was to be ascribed to those waters, or to the revulsion made by repeated bleedings, or to a spare and cool diet. to riding, and the strengthening quality of the bark, which at first had no effect as an astringent. It was remarkable, that, from the time the patient left Bristol, he not only had no return of the hæmoptoe, but none of the gravel ; though, from certain sensations, he still suspected the soundness of the left kidney, and therefore would never lie on that side, in order to keep it the cooler. After leaving the wells, he continued to drink every morning, fasting, and every night at bed time, about half a pint of Bristol water, aired, with about an ounce of Minorca honey dissolved in it. One of his old servants told me, that he believed his master had not for one day intermitted this draught, from the time

he began to it, to his last sickness; and that, from the first attack of the hæmoptoe, to his death, he had lived in a very regular manner, eating of the lightest flesh meats, and that sparingly, living chiefly upon vegetables, drinking a little pure wine, seldom any malt liquor, keeping good hours, and using constantly moderate exercise, mostly on horseback.

ABOUT the middle of March last, 1760, the patient began to complain of great want of rest, and, about three or four weeks after, of a tenesmus, of gripes, and mucous stools streaked with blood: But this disorder of the bowels, after two doses of rhubarb, soon yielded to some draughts of oil and manna, taken twice a day. However, as the watchfulness continued, and the patient felt some more than usual pain in his belly, towards the left side, apprehending a return of the gravel, he first consulted Dr Duncan, and, in a few days after (on the 27th of April) he likewise called me.

AT that time he was troubled with a hiccup, which had begun the day before

fore I saw him. The pain of his belly was almost constant, sometimes sharp and darting to his back, sometimes to both the groins and testicles, especially when he turned to his right side; for, as to the other, he never attempted to lie on it. He complained of want of rest to such a degree, as not to be sensible of having slept half an hour together for six weeks, or of shutting his eyes for the last three. His pulse was quicker, harder, and fuller than natural; he had some drought, but otherwise no feverish symptoms; and his head was perfectly clear. Sometimes he mentioned a numbness in his feet, and such fits of lowness as confined him to his bed, and made him call for more wine than he usually drank when he was well. Since the purging was stopped, he had scarce had a motion without taking some laxative, and then the pain of his belly was generally lessened for some time. His water was of a natural colour, was made freely, and in due quantity; it sometimes had a cloud, but never any sediment. He complained of

no

no sickness at his stomach, but his appetite was quite gone.

THOUGH the patient had been bled twice before, yet we judged it proper to take away seven or eight ounces more of blood, which, like the former, was very fizy. But, as none of these evacuations relieved him, and as he grew daily weaker, the bleeding was not further tried. Upon the first attack of the hiccup, he took some musk, which having no effect, we suspected that this symptom might be occasioned by a large quantity of acids, which the patient had used for some time before; and therefore we attempted to remove that sharpness by absorbents, which likewise proved ineffectual. We then repeated the musk in such large doses, that he swallowed three drachms in twenty-four hours, but with no better success. Opiates were not omitted, and, both on account of the hiccup, and in order to procure sleep, laudanum was given first in smaller doses; but, on the 30th, (the fourth day after I was called)

called) we ordered forty drops at bed time, with directions to give, every three hours, twenty drops more, till the patient should fall upon rest. That night 100 drops were taken, without bringing on a slumber, or checking the hiccup in any degree. But the opiate raised a thorough sweat, and, when that broke out, his spirits were relieved, and the pain ceased. In this state, we found the patient in the morning, and, his head being still clear, we ordered a draught with forty drops of the *tinctura thebaica*, and a scruple of musk: But this composition had no more efficacy than the ingredients separately. He continued broad awake, sensible, and in good spirits, though the hiccup never stopped. About four in the afternoon, he called for something to drink; but, before the servant could warm the liquor, he suddenly expired.

NEXT day, in the afternoon, the body was opened by Mr Burnet and Mr Hunter surgeons, Dr Duncan and I being present.

THE abdominal viscera were, to all appearance, found, even to the left kidney, which some years before had generated much sand and calculi, and continued still to be suspected by the patient. The stomach, the intestines, and the diaphragm were free from any mark of inflammation, notwithstanding those parts had suffered, first by the flux, and afterwards by the hiccup, which symptom had been almost constant for the last six days of his life. The gall bladder contained a moderate quantity of bile of a natural colour, without any stones or obstructions in the ducts.

THE only diseased part of the body, so far as it was inspected, was a tumour larger than one's fist, of an oblong figure, lying upon the left side of the spine and the *aorta descendens*, in the direction of that vessel. This tumour was of a firm consistence, beginning as high up as the emulgent arteries, where it adhered to the transverse flexure of the duodenum, and from thence descending till it came near the pelvis. Upon its surface, but within  
the

the cellular membrane, we perceived a good deal of extravasated blood, and found some more of the same in the adjoining parts of that membrane, extending to the pelvis, and to the left side, between the peritonaeum and abdominal muscles. In order to the better examination of this substance, it was taken quite out of the body, together with some part of the aorta above, and the iliacs below. Having laid open that part of the aorta the whole length of the tube, we observed a compleat rupture of all its coats, upon the left side of the vessel, between the emulgents and lowest mesenteric artery. This aperture had lacerated edges, was large enough to admit the dissector's thumb, and led into the tumour, which now appeared to be a spurious aneurism of the great artery; that is, a sac formed of the cellular membrane, containing some blood of different degrees of coagulation, which, apparently, at different times, had issued from the aorta. That portion which lay next the artery was as firm as what is found in aneurisms of a year's

year's standing, and was of the same lamellated structure. Beyond this, there was a much larger quantity of blood slightly cloated; and this, with the blood, which, as observed before, was diffused on the surface of the tumour, and in the rest of the cellular membrane near it, seemed to have burst from the vessel, just before the death of the patient, and indeed to have occasioned it. The whole quantity contained in the cyst, and diffused around it, exceeded a pint. The aorta was not dilated about the aperture; but its coats at that place were harder than natural, as if tending to ossify; and, having lost their natural elasticity and toughness, were easily pulled asunder.

THE heart and lungs were in a natural state. The former was without any polypous concretion, and the latter without any tubercles or adhesions, except in the right side, where the lower part of the lobe adhered slightly to the diaphragm; and, about that part, we found in the lungs a few small concretions of no consequence.

UPON the review of the whole, we concluded, that a small aperture had at first been made at this weak part of the aorta, some considerable time before the death of the patient, that the tumour had been gradually formed by the oozing of the blood into the cellular membrane surrounding the artery, and which thereupon was dilated into that sac mentioned above. That this tumour growing larger, and in time pressing upon the intercostal nerves, had excited the pain which the patient complained of in the left side of his belly; and that it became at last so large, that, either by pressing more upon those nerves, or upon the transverse flexure of the duodenum, it occasioned the hiccup, which could never be stopped, as the irritation was always increasing. That the continuance and violence of the hiccup had been the cause of a sudden and greater rupture of the aorta at that part which was already open, and that, by this enlargement of the orifice, the blood had gushed out, in such a quantity as to occasion a considerable

VOL. III.                      D d                      effusion

effusion around the tumour, and to stop the circulation at once.

The chief practical conclusion was, that, after a violent hæmoptoe, of some months standing, a patient may still hope to have sound lungs; and that, after undergoing many nephritic paroxysms, for years together, the kidneys may be perfectly restored. That the thorough recovery from those illnesses was principally owing to temperance, a cool regimen, and constant moderate exercise on horse-back. That it was probable that the Bristol water had been of service both in the hæmoptoe and gravel, but that the honey afterwards joined to it had been the chief means of keeping the kidneys clear; and thereby allowing nature time for repairing the damage which that organ had suffered by the generation of so much sand and stones during a course of years.

London, October 3.

1760.

CASE

## C A S E IV.

A man, thirty years of age, was brought into St George's Hospital, on account of an aneurism in his ham, of the size of a hen's egg.

It had begun three months before that, after he had laboured, for a considerable time, under a fever and rheumatism. As he was otherwise seemingly in good health, except weak, and had no other aneurism but this, the amputation of the limb above the ham was performed. For nine days after the operation, every thing appeared to go on well; but, on the morning of the tenth, he was suddenly seized with a locked jaw, and died the following night.

THE second day after his death his body was opened. All the viscera seemed perfectly sound, and we could observe no appearance of any other aneurism in the arterial system: But the arteries we thought were rather of a more lax texture than common.

CASE

## C A S E V.

MICHAEL CONELLY, a middle aged man, who used to carry a sedan chair, some time in the beginning of the year 1763, perceived a swelling about the size of a walnut, which had a strong pulsation in the upper part of the right thigh, contiguous to the *os pubis*, which he could not account for. Several months after this, he shewed it to Mr Gataker serjeant surgeon extraordinary to his Majesty, who immediately knew it to be an aneurism; it was then about the size of a very small hen's egg, had a strong pulsation, and the feel of a circumscribed tumour.

MR GATAKER brought the man to St George's Hospital, where he consulted with the other surgeons, who all agreed that the aneurism was situated too high to attempt any operation.

ABOUT mid-summer 1764, when it was rather larger than a common egg, it

lost

lost its form of a circumscribed tumour; the whole upper part of the thigh swelled, and the pulsation became more obscure, and at last was scarce to be perceived. Some months after this, the skin on the fore part of the thigh became very thin and red in one or two places, and soon after an oozing of blood and matter was perceived to come from one or two small orifices, which gradually enlarged till the 27th of January 1765, when one of them burst suddenly in the evening, and the man fell down dead immediately, as if he had been shot with a ball through the heart.

NEXT day his body was opened. The right crural artery, just as it passed over the *os pubis*, opened into a very large cavity, filled with a firm coagulum, larger than the head of a child of three years of age, and a quantity of grumous and fluid blood, mixed with a black very foetid matter.

UPON emptying the sac, and cleaning it with a sponge and water, part of its  
fore

fore and inner side seemed to be formed of the coats of the artery, and the rest of this and of the other sides to be formed of muscles, cellular membranes, aponeuroses, &c. Part of the thigh-bone was bare and carious, and several of the muscles were flaccid, livid, and eroded.

THE part of the side of the cavity which appeared to be formed of the coats of the artery was smooth on its internal surface, and continued from the upper opening of the crural artery into the sac for about two inches down, till it came to its lower orifice, which was so covered with a membranous matter, formed of the coagulable part of the blood, that it was some time before we could discover it. Upon opening the artery from this part downwards, it was found to be filled with a firm polypous substance for some inches, till where it sunk behind the adductor muscle to get into the ham.

THE crural and iliac artery above the upper opening into the sac were in a natural state.

THIS

THIS seemed to me to have been originally a true aneurism, such as the one situated in the right groin of John Parker, but which had burst on the back part; and the blood from the artery formed the large cavity filled with the coagulum and grumous blood.

### C A S E VI.

ON the 4th of February 1765, I was present at the dissection of the leg of a man, which had been taken off above the knee in the Westminster Infirmary for an aneurism in the ham, which had begun in May 1764, without any evident cause.

IT had had, at first, the feel of a small circumscribed tumour; but, long before the operation had lost that appearance; and the whole ham was distended into a large tumour. The cavity was large, filled the whole ham, and extended itself between the popliteus and gastrocnemii muscles; and was capable of holding above

a pint of liquor; the fibres of part of the gastrocnemii muscles were eroded.

THE crural artery, at the part where it gets the name of poplitea, before it divides into the two large branches, the tibials, opened into the aneurifmal sac, which was filled in the same manner as the other, and had a similar appearance in every respect; the orifices of the arteries which went off from the sac were impervious, and covered with a firm membranous coagulated blood, and the arteries themselves filled for some way with polypous concretions. The patient's foot had begun to mortify for want of circulation, before the operation was performed.

THIS aneurifm was certainly a true one originally, and had burst on the back part, and was of the same kind as the large one in the right ham of John Parker; only the bones were not bare and carious as in his case.

CASE

## C A S E VII.

*The following is a remarkable instance of the Rupture of a large Artery from a Fall.*

ON the 23d of December 1764, John Robertson, a carpenter by trade, in full health, being in liquor, fell several times in the streets. On the 26th or 27th, he perceived a swelling in the middle of his left thigh, which had a strong pulsation, and gave him pain; by the third of January 1765, it had increased considerably, and gave him racking pain, and he was brought to St George's Hospital. Next day the surgeons had a consultation on his case, and were all of opinion, that it was a false aneurism, occasioned by the rupture of some large artery; that the aneurismal sac ought to be opened, and, if the ruptured vessel was found to be only a collateral branch of the crural artery, that it ought to be tied, and the

wound treated as after the operation for the false aneurism of the arm; but, if it proved to be the trunk of the crural artery which was ruptured, that the amputating the limb was the only method to be used to save the patient's life. When the operation was performed on the 5th, it was found to be the trunk of the crural artery which was ruptured; the limb was amputated, and the man is now in a fair way of recovery, it being four weeks since the operation. There was a little hardness round the artery below the rupture; but the man had never felt any uneasiness in that thigh before the accident of the fall on the 23d of December.

### C A S E VIII.

A strong middle aged man, who served as a sailor on board of one of his Majesty's ships of war, in the time of the siege of the Havannah, felt a pain in his heel, which

which he did not know how to account for; soon after he perceived a swelling and throbbing in the calf of his leg. When he returned to England, the swelling increased, and was attended with such a strong pulsation in the part as evidently shewed it to be a true aneurism. From the size and the feel, it was evident, that the coats of the artery had already given way, and that the aneurismal sac was formed of membranes, muscles, &c.

MANY remedies were applied, but they gave him no relief. At last, in February 1765, the surgeon who attended him, after consulting some of his brethren of the first eminence, performed the following operation. A tournequet being put above the knee, he made a large longitudinal incision through the gastrocnemii and soleus muscles into the aneurismal sac, and took from thence a very large firm coagulum of blood. Having wiped and cleaned the cavity with a sponge dipped in warm water, he tied the ends of the arteries which opened into the sac

at

at the ham, filled the wound with soft lint, and applied proper bandages.

FOR three days after the operation, every thing seemed to do well; there was a kindly warmth in the foot, and no more fever than was to be expected after such an operation; but, on the fourth day, the patient began to sink, the foot to feel cold, and a gangrene to appear on the sides of the wound; and he died the sixth day after the operation.

### C A S E IX.

THE following case was similar to that of John Parker, in the patient's having more aneurisms than one, and there being seemingly an universal weakness of the arterious system, and a disposition to form aneurisms.

A middle aged man, who used to be employed in husbandry work, about Michaelmas 1764, after being one day  
much

much fatigued, sat down to rest himself; and, having accidentally put his hand on his thigh, perceived an uncommon beating in the part, and shewed it to some of his neighbours; but thought of it no more till some time after that he felt an uneasiness, and perceived a small swelling, and a strong pulsation in the part. The swelling did not increase much for five months after; but, about the end of February, or beginning of March 1765, it began to increase very fast. In the beginning of April, he came to town; the swelling was then as large as a hen's egg, had the feel of a circumscribed tumour, and such a strong pulsation, as pointed it out to be a true aneurism of the femoral artery, at the part where it begins to sink among the muscles to get behind into the ham.

UPON inquiring into the man's history, he told me, that he had long enjoyed a good state of health before he perceived the throbbing in his thigh, and that he was not sensible of his having made any  
vio-

violent effort, or of his having done any thing to occasion the swelling.

As the aneurism of the thigh was the only one that was to be observed, and it had already somewhat the appearance of pointing outwardly, and must burst, and put an end to life soon; it was thought advisable to amputate the limb above the aneurism. This was done; but the man died next day.

UPON dissecting the aneurismal tumour of the thigh, it was found to be formed by a dilatation of the coats of the artery; the cavity was about the size of a small hen's egg, and was filled with a firm coagulum of blood, such as is commonly to be met with in true aneurisms; it was somewhat of the shape of that found in the left ham of John Parker; it protruded forwards, and towards the inside of the thigh; and, at one part, the coats of the artery were extremely thin, and ready to burst. The distance between where the artery opened into the aneurismal sac or dilated part of itself, from where it went out of it, or returned to its natural size, was only

ly

ly about an inch, though the aneurismal sac was double this length on the forefide of the artery, and towards the infide of the thigh. The coats of the artery were fomewhat indurated, and furrounded with fmall fteatomatous tumours for fome inches below the aneurismal fac.

As the man died fo fuddenly, his body was opened the fecond day after his death, when feveral aneurifms were found in the cavity of the abdomen.

THE fuperior mefenteric artery, juft as it arofe from the aorta, was dilated for above the length of an inch and a half, and was near an inch diameter in the middle of the aneurismal fac, and was filled with a firm coagulum. The left emulgent artery was dilated at its beginning to the fize of a filbert nut; and the inferior mefenteric artery was beginning to be dilated juft as it arofe from the aorta.

An attempt was made to inject the veffels of the left kidney; but the veffels burft upon a very fmall force being ufed to push forward the injection.

FROM

FROM the case of this man, and that of John Parker, we may conclude, that the arterious system is sometimes universally diseased, though we neither as yet know how this happens, or can assign any cause for such a disorder; and, from these cases, we may judge how doubtful the success of any operation must be, that is attempted for the cure of any true aneurism in the extremities, which comes without any external injury done to the part.

ARE aneurisms become a more frequent disorder than formerly, or do physicians and surgeons inquire more minutely into the nature and causes of diseases, and inspect more narrowly into dead bodies than in former days? The latter I should suppose to be the case, from the aneurisms which I have seen, which were all in people in a low rank of life, who, in former times, had not so frequent opportunities of consulting physicians and surgeons of experience, or of being received into public hospitals.

CASE

## C A S E X.

ANN FOWLER, a woman between twenty-seven and twenty-eight years of age, was admitted into St George's Hospital, the 13th of June 1763, for an aneurism in the aorta; which protruded outwards on the back between the lowermost rib and the *os innominatum* of the left side, of which she gave the following account.

THAT, on the 22d of the March preceding, being nine months gone with child, she fell down some steps of a stair, but did not perceive that she had received much hurt. That she was brought to bed the 25th; and, in a few days, thought herself as well as a woman in that situation could expect. But that, in a fortnight thereafter, she felt a strong throbbing in her back, and, in a few days, perceived a small tumor, which protruded on the left side of the spine of

the back, and which had gradually increased from that time to the size it was then of, which was about equal to that of half a large China orange.

THIS tumor had a strong pulsation, and the patient complained of having lost her appetite, and being often sick; and that she had particularly much pain and sickness if the tumor was hard pressed. Her pulse was quick and small, but had no intermission, and was otherwise quite regular.

THESE complaints continued without much alteration, till within four or five weeks of her death; only, that once or twice on being fretted, and turning uncautiously on her back, her pulse became quick, and so extremely low, attended with an excruciating pain in the part, and sickness at the stomach, that we imagined she was dying; but she recovered gradually from these low fits, and her pulse returned to its former state.

ABOUT five weeks before she died, the tumor extended on the lower part towards the spine, and the skin became of

a light reddish colour in the middle of the tumour, and we began to suspect that it would break outwardly.

FROM her first admission into the hospital, it was evident what the case was; and therefore I ordered her no other medicine but a saline draught twice a day to amuse her; and added to it, occasionally, a little *magnesia alba*, or gave her a little lenitive electuary when she was constive, and an opiate at night, when she complained much of pain through the day; and I allowed her whatever sort of mild food she had a mind for.

FOUR weeks before her death, her pain increased, and she became low; and said, she felt as if a stream of cold water was running down from the tumour into the lower part of the left side of her belly.

FOR a week before her death, the pain became so excruciating, that, though she took a grain of opium every two or three hours, she found no relief, and could not lie with ease in any posture; and she sunk daily, and died the 24th of March 1769.

NEXT

NEXT day, her body was opened. The stomach, intestines, liver, and spleen, seemed to be all in a perfect sound state. The diaphragm on the left side was pushed up some way into the cavity of the thorax; and the lungs of that side adhered very much to the pleura, and contained a good deal of a thin, bloody, somewhat purulent-like matter, and had a number of small tubercles dispersed through their substance.

THE lungs of the left side, and the stomach, intestines, and spleen, being taken out of the body, and the lungs of the right side, and the upper side of the liver, being turned to the right side, and stitched firmly to the inside of the ribs; we observed, that the left side of the cavity of the abdomen was filled with one large black tumour, which, on examining, proved to be the cellular membranes behind the peritoneum, which covered the kidney, filled with blood. On cutting thro' the peritoneum, and these membranes, we found the kidney found below, which

we removed; and then laid the aorta bare from its coming out of the heart till near its division into the two iliacs, which brought into view a large aneurifmal sac, which extended from the diaphragm to the *os pubis*.

THE upper part of this aneurifmal sac was formed by a dilatation of the coats of the left side of the aorta, which, at first view, seemed to be dilated from where this vessel first passes through the diaphragm till some way below where the emulgent artery of the right side goes off to the kidney; though it afterwards appeared that the dilatation begun much lower, about an inch above the rise of the cæliac artery, and extended no further than just below where the right emulgent goes off. The distended coats of the artery extended upwards and downwards, and towards the left side, so that this part of the sac which seemed to be formed by them was full four inches long and three inches broad, though the length of the aorta, which

was

was dilated, was but two inches in all.

THE lower part of the sac was larger than the upper, and extended as far down as the *os pubis*; and its coats seemed to be made up of the peritoneum and cellular membranes; and it appeared as if this part of the sac had been recently formed by the coats of the true original aneurifmal tumour giving way at the lower part, and allowing the blood to pass into, and distend the cellular membranes behind the peritoneum, and to raise and push it forwards. Perhaps the coats of the true aneurifm began to give way at the time the patient complained of the sensation of a stream of cold water running down into the lower part of the left side of the belly.

IN dissecting off the membranes, to have a more distinct view of the whole tumour, I accidentally tore part of the sac, where its coats seemed to be formed of the peritoneum and cellular membranes, and there came out a quantity of cloated blood. I then introduced my finger through this aper-

aperture, and found that the upper part of the sac was filled with a firm fibrous coagulum, which afterwards, when it was taken out, appeared to be exactly similar to what is always found in aneurisms which have been of any standing; but the lower part was filled only with recent coagulated blood. The aneurifimal sac adhered firmly to some of the vertebræ, and to the lower ribs; and these bones were become carious, and formed part of the sides of the sac.

I then had the aneurifimal sac cut out of the body, and, in dissecting it away, I observed that it adhered very firmly to the last dorsal and the first and second lumbar vertebrae; and that the pulsation of the blood had wore away part of the aneurifimal sac, where it adhered to those bones, and that they were bare and carious on the left side of their bodies; that a number of small osseous spines had grown out every where from the carious parts; and that the cartilage between the first and second lumbar vertebrae was wore away for near half an inch deep on  
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the fore and left side; and that the lower side of the last rib was bare and carious.

I next examined that part of the sac which had formed the large tumour on the back, and found, that the force of the blood had drove the sides of the dilated artery backwards, quite through the muscles of the back, till it had reached the skin.

THE hollow which remained, after the aorta, with the aneurismal sac, and fibrous coagulum were taken out of the body, appeared to be about three fourths of as exact a spherical figure, of three inches and a quarter diameter, as if it had been formed by a turning wheel. It reached from the lowermost rib to the spine of the ileum.

ON examining the inside of the fore part of the aneurismal sac, (the only part which could be taken out intire), I observed, that the aorta had not begun to be dilated for near an inch lower than it had appeared to be on the outside, and that

that the artery had returned to its natural size again, immediately below where the right emulgent artery takes its rise from the aorta; and that there were a number of ossious concretions spread on the internal surface of the sac round the lower orifice where the aorta returned to its natural size, and went out of the sac.

AND, on examining the fibrous bloody concretion, which filled the upper and back part of the aneurifmal cyst, I found that there was a hollow or furrow on the fore part, through which the blood could pass freely from the upper part of the descending aorta to the lower; to be distributed through the lower extremities, which was certainly the cause why the pulse continued regular and without intermission during the whole course of this tedious and troublesome disorder.

As this was a very singular and particular case, I prevailed with young Mr Home of Suffolk-street to make a drawing of the aorta and aneurifmal sac, in their natural situation, which gives a

more distinct idea of the situation of this aneurism than any description. As we expected that the friends would bury the body soon, he had time to make only a sketch, and that not so finished as otherwise it would have been; and next day, he made a sketch likewise from the inside of the fore part of the aneurismal sac; both which I send you with this.

## T A B. III.

FIGURE I. Represents the thorax and abdomen, with the lungs and intestines taken out, and the aorta laid bare from the heart to below where the dilatation ended.

AA. The Heart.

B. The descending Aorta.

CC. The part of the aneurismal Tumour formed by the dilated coats of the Artery.

DD. The lower part of the Tumour, formed by the cellular membranes distended with blood behind the Peritoneum.

E. The cæliac Artery. F. The superior Mesenteric.

GG. The

GG. The Emulgents. The left cut before it went to the left Kidney, which had been taken out of the Body, and the right going under the *Vena Cava*, which is represented by HH.

II. The Ureter of the Kidney.

KKKKK. The Root of the Mesentery and Cellular Membranes distended with blood.

LL. Part of the Colon and Rectum which was left in the Body turned down towards the right side of the *Os Pubis*.

MMM. The cut Diaphragm.

NNN. The Liver turned up under the right ribs, and stitched to them.

OO. The Sternum turned up.

PPP. The Integuments turned down over the *Os Pubis*.

FIG. II.

AA. The Aorta above the aneurismal Tumour.

BB. Its entry into the Aneurismal Sac.

CC. Where it went out.

D. The

D. The opening of the Cæliac Artery.

E. The opening of the Superior Mesenteric.

F. The opening of one of the Emulgents.

G. G. Offications on the internal surface of the aneurismal Sac.

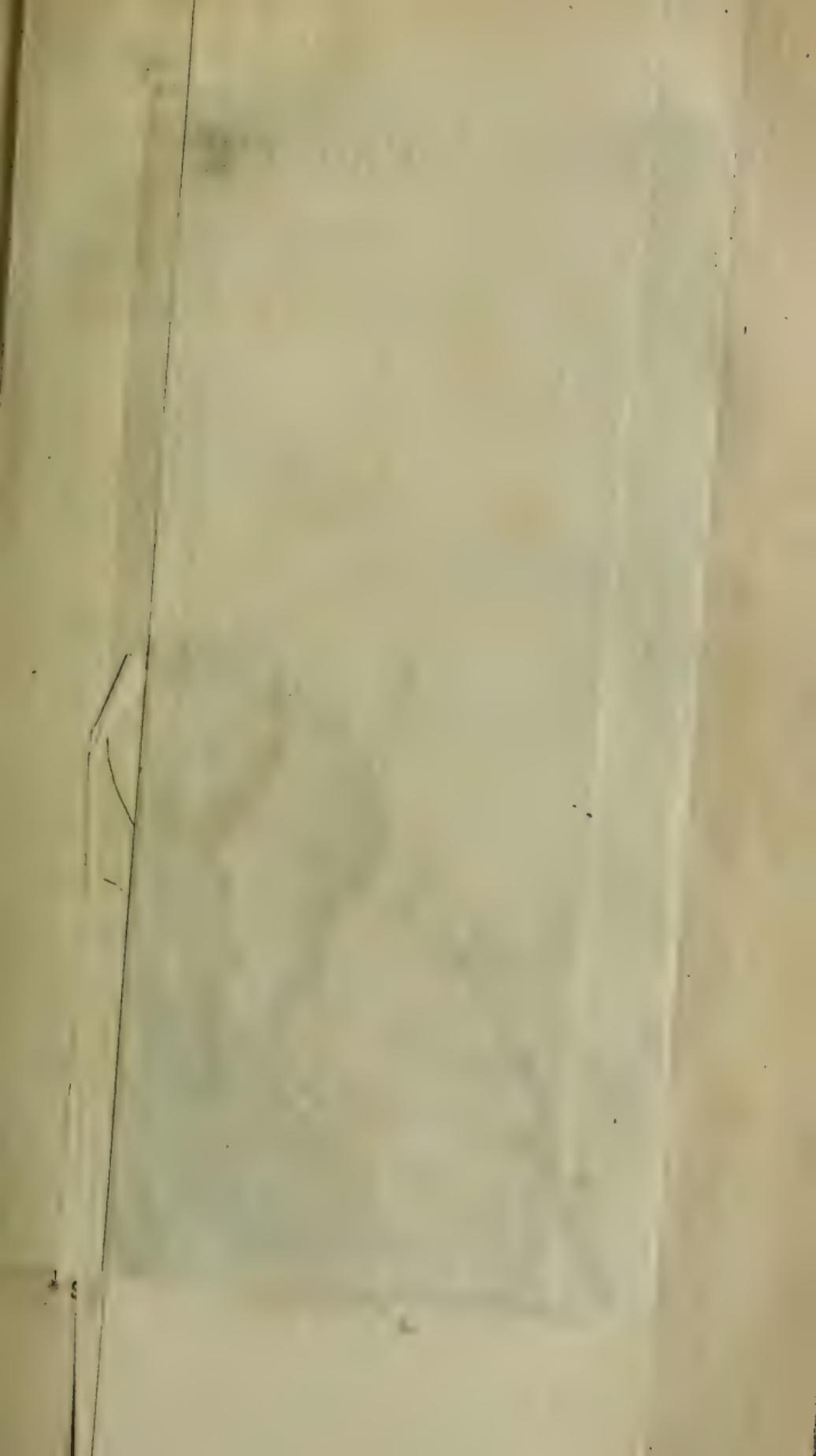
H. H. The Aorta below the aneurismal Sac.

*Observations on Aneurisms by Dr D. MONRO.*

London, August 15. 1760.

THE disorders which now go by the name of Aneurisms seem to have been overlooked by the ancient physicians, till Galen\*, who mentions anastomosis and a wounded artery as causes that may produce them; but describes only the symptoms by which aneurisms in general

\* See Galen de Tumoribus, cap. 2.



ТАВ III.

Fig 2



ral may be known, without telling any appearances by which we can distinguish whether the disease is owing to the one or to the other of these causes. Paulus of Ægina, after copying Galen's words, pretends to relate the symptoms peculiar to the disease, when caused by anastomosis, or by a wounded artery; and directs a different method of operation for each\*.

AT present, Physicians understand, by the name of Aneurisms, all considerable dilatations of arteries, and all tumours filled with blood which communicate with the internal cavity of any of the larger arteries, but divide them into the *true* and the *false* or *spurious*, and the *mixed*; calling those *true*, where all or some of the proper coats of an artery are dilated; and, those *false* or *spurious*, where there is no such dilatation of the coats, but such an aperture in an artery of the larger series as allows blood to flow into a cavity or cavities, and form a tumour;

\* See Paulus Æginaeta, lib. 6. cap. 37.

tumour; and those *mixed*, where an artery has been first dilated, but afterwards, by the great stretching or erosion of its coats, they have given way; and the blood has either distended the neighbouring cellular membranes into one cyst, or diffused itself every where through its cells\*.

## P A R T I.

### *Of True Aneurisms.*

FOR a long time, it was a matter of dispute, whether, in the true aneurism, all the coats of the arteries were dilated, or whether some of them, particularly the circular fibrous, commonly called muscular, was not always ruptured or wounded before the force of the blood was capable of dilating the vessel. Later experience

\* Lancisi thinks that dilatations of the ventricle of the heart should likewise be called aneurisms; but in this he is not generally followed.

perience has shewn, that aneurisms may be formed in both these ways.

THAT all the coats of arteries are sometimes dilated, is plain to ocular demonstration, from the dissection of the aneurismal sacs in the case of John Parker \*. For, in the three smaller ones of the right side, the circular fibres, and all the other coats, were traced distinctly over the whole circumference of the tumours: In the one in the left ham they were seen on the fore side; and, although they could not be traced on the back part, nor be at all observed in the

\* It may seem surprising that I should quote so particularly this case for a fact now so generally looked upon as common. The reason of it is, that, although we have many histories of cases of true aneurisms related, yet I have not found one of all those I have examined, where the different coats of the arteries have been traced by dissection, continued over the whole circumference of the aneurismal sacs. Haller is the only good anatomist who says he observed all the arterious coats, particularly the muscular, in an aneurism. But then he gives no figures of these coats; nor is he particular in the history of their dissection. See his account of an aneurism of the aorta. *Opuscul. Pathologic. Observ.* 18.

the large sac of the right ham, it is most probable that these two aneurifms were originally formed in the same manner as the others; though the violent stretching, and the mixture of other substances with the coats of the sac, confounded all the parts so much, as to make such a demonstration impracticable. And we may presume, that so many good anatomists, who have given us histories of what they call true aneurifms, were not deceived in the nature of the disease, although they have not described minutely the texture of the aneurifinal sacs, corresponding to that of the arteries in a natural sound state. Probably the state to which the greater part of true aneurifms have been reduced before they were examined, has contributed to this inaccuracy of the observers. Most of them, we have any account of, had degenerated into the mixed kind; and the coats of the artery were either blended with osseous, steatomatous, purulent, or other morbid matter; or they were destroyed by erosion or overstretching, or were incorporated or confounded with

with the neighbouring cellular substance, and membranes, or aponeurosis that lay above the artery, as was the case with the one in the right ham of the first history I mentioned, long before the tumour burst externally, or otherwise put an end to the patient's life.

ALL the cavities of the human body are capable of being distended, and the vessels of being dilated. The veins are often observed to become varicous, and the arteries, on some occasions, to swell into aneurismal sacs. The greater part of the true aneurisms, we have any account of, came of themselves, and no cause could be assigned for their origin. Strainings of the body, an increased momentum of the blood, and a stop put to its free circulation through some of the large vessels, has been alledged to give rise to severals: However, this can only happen where some particular vessel has been overstrained, and so much weakened as not to be able to resist the force of the circulating blood; or, where there has

been a former relaxation or predisposition in the vessels to suffer themselves to be dilated, otherwise aneurifms should often be observed in high fevers, and after amputations of the larger extremities.

IN many cases there seems to be some cause, which we cannot ascertain either from the habit of body, or from any particular structure or disorder of the parts observed after death. Sometimes a scorbutic or venereal taint, or some other acrimony in the blood, has been accused; at other times, particular obstructions or diseases of the arteries, at the part where they were dilated, have been said to occasion them. And certainly, there must either be a particular disposition of the blood, which renders it capable of softning or relaxing the arterial fibres, or some disorder in the fibres or vessels affected, or a particular quality in the fluids thrown upon such parts, before an aneurifm can be produced; tho' these causes may be too subtile to come under the observation of our senses; for,

how

how often do we meet with cafes of general lax habits, of palsies, of a general softning of the bones of the body, where we can discover no fault, either in the blood or in the structure of the parts? The particles of our fluids are too subtile, and the sensible qualities of our blood, even when affected with diseases of very opposite natures, are so near to each other, and the vessels and fibres affected are so fine as not to be capable of coming under the observation of our senses, which can only judge of objects many thousand times more gross than these.

THE cafes of the two unfortunate patients I related above, are amongst those for which no causes can be assigned. John Parker certainly laboured under no venereal taint; otherwise, in the space of twenty years, it would have shewed itself some way or other. He had committed no excesses, or received any particular injury in the parts where the aneurisms appeared. He was in a good state of health when the rupture came down; he underwent a dangerous operation, was blood-

ed and kept upon low diet, by which the force of the circulation was moderated; a good suppuration came on, and a complete cure of the rupture was made, which shewed his juices to be in a good state. The keeping the knee bended towards the thigh, while he lay in bed under cure for the rupture, might have been alledged to have given rise to the aneurism under the left ham which first appeared, had not others come afterwards in the right ham and thigh, where no such cause could be assigned. There was no particular obstruction in the arteries for some inches below any of the tumours; and, although we omitted examining the state of the arteries down to their extremities; yet, as in so many months no gangrene threatened till the circulation was stopped in the thigh with the tournequet, and as the natural heat, sense, motion, and size remained in the left leg, and that there was no more oedematous swelling came on the right one than was to be expected from the pressure of so large a tumour in the ham on the  
the

the returning veins, we may conclude, that there was no such obstruction in the arteries below, as was capable of giving rise to the aneurisms. Nor can we, with certainty, assign any cause for the aneurism which appeared in the armpit of Thomas Cook; for it may be doubted whether an obstruction of the axillary artery gave rise to the aneurism, or whether the pressure of the aneurismal sac on the artery was not rather the cause of the concretion of its sides.

WE have no pathognomonic symptom by which we can know the true aneurisms when seated deep in any of the great cavities of the body, till such time as they become so large as to be felt by external pressure, or to protrude outwards; for the symptoms attending them differ according to their situation, and are so similar to those produced by other diseases, as to make it impossible for us to distinguish them in the beginning. Perhaps a train of circumstances and symptoms, joined to the patient's complaining

plaining of a strong pulsation in the part, may lead us to suspect what the case is, though we can never be certain till it can be felt or seen. But, when aneurisms are situated in the neck, or in the extremities, then they are immediately distinguished by their yielding to the fingers, and having a strong pulsation, though afterwards, when they grow large, they sometimes lose it.

MOST aneurisms gradually increase in their size, and, sooner or later, they protrude towards that side where they meet with the least resistance \*, as we see by  
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\* De Haen gives an instance of an aneurism of the aorta, which protruded between the second and third ribs of the left side, where the external tumour, instead of increasing as generally happens, suddenly disappeared, and was not to be perceived for above a month before the patient's death, though, upon dissection, the aorta at its curvature was found to be dilated to the size of three fists: De Haen attributes this sudden disappearance of the external humour to the weight of the aneurismal sac having loosened its attachment, and to its having fallen more within the thorax when the patient lay on the right side, for the difficulty of breathing, and other symptoms of oppressed lungs, increased immediately on its disappearance. *Ratio Medend. par. 4. cap. 2. 17 9.*

the two which were situated in the hams of John Parker, which both extended backwards, and by the histories related of true aneurifms, proceeding from an internal cause. Aneurifms of the aorta, at its beginning and curvature, however, are exceptions to this rule; for here we find, that they have generally protruded either forward towards the sternum, or upwards towards the neck, as the stream of blood coming from the heart strikes stronger against the forepart, and the upper side of the curvature of the aorta, than any where else.

IN the true aneurifm, the pulsation I believe, for the most part continues strong till the coats of the artery burst, and the aneurifm becomes a mixture of the true and of the false kind; after which, indeed, the tumour often increases considerably, large polypous concretions are formed, and the pulsation ceases. Many authors tell us, that the pulsation frequently ceases before the aneurifm bursts; this often happens in false aneurifms; but, from

from what I observed in the case of John Parker, where we had examples of true aneurisms in all their different stages, I think we have reason to believe, that the pulsation does not in general cease, (tho' perhaps it may in some rare cases), till the true coats of the artery have burst. For, in all the aneurisms where the coats of the artery were intire, there was a strong pulsation to the last, even in the one of the left ham where there was a large polypous concretion; and, in the one of the right ham, which at last burst, there was a strong pulsation long after the aneurism had lost the appearance and feel of a circumscribed tumour, and we had reason to believe, that the true coats of the artery had burst, and that it had degenerated into an aneurism of the mixed kind. Hence, surgeons ought not too hastily to conclude, from the want of pulsation, that soft tumours situated above large blood vessels are not aneurisms, but ought carefully to examine into their cause, progress, situation,

attachments, and other circumstances, of all such as are in the least suspicious, before they make any puncture or incision into them; for many fatal accidents have happened by their opening aneurisms \*, which they mistook for abscesses, from their having no pulsation.

ANEURISMAL sacs generally contain lamellated and fibrous-like polypous

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concre-

\* We have a great many instances of fatal consequences from aneurisms being opened, by mistake, for abscesses. Vesalius was consulted for a tumour on the back, which he declared to be an aneurism; some time after an ignorant surgeon opened it, and the patient died instantaneously of a profuse hæmorrhage: Bonet. Sepulch. Anat. lib. 4. sect. 2, obs. 21. Lancisi gives a similar case, where a quack made an incision, after he, Lancisi, had given his opinion, that it was an aneurism: De Aneurism. prop. 21. De Haen tells of a patient, who died from one of the knee being opened, after Boerhaave had advised the patient not to allow an aperture to be made: Rat. Medend. part 4. cap. 2. Ruysch says, that a friend of his, though an expert surgeon, opened a small aneurism near the heel for an abscess; and the patient was very near dying of a hæmorrhage: Obs. Anat. observ. 38. Many more examples of this kind are to be found among the observers.

concretions; the true aneurifms, however, when small, may be without them, as was the case with the three upper ones of the right, and with the small one situated high up in the left thigh of J. Parker. The smaller an aneurifm is, the more equally its coats are distended every way; and the more gradually it increases to, and diminishes from its largest transverse diameter, the less apt it will be to have polypous concretions formed in it, as the stream of blood through it is then freest; but the larger it is, and the more it protrudes to one side, in form of a pouch, the less free will the stream of blood be through it, and the more the blood will be apt to stagnate, and to concrete. These were the reasons why there were polypous concretions in that of the left ham of John Parker, why they are found almost always in mixed and false aneurifms, and why there were none in the four mentioned above.

MOST aneurifms, when they come to be large, and lie contiguous to bones, render such bones carious; the sides of the

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the aneurifmal cyfts generally grow firmly to the bone, and the force of the blood acting continually againft the fides of the artery, while it is refifted by the firm bone on the other fide, wafte away that part of the cyft, gives rife to obftructions and fuppurations of the bone, or its membranes, lays bare the bone, and renders it carious, as we find by examining many cafes of aneurifms related by authors \*. Frequently the pulfation of the blood againft the fides of the cyft, and the preffure of the cyft againft the bone, give rife to obftructions, and confequent fuppurations, and render the  
bone

\* See a cafe where the ribs were rough and carious in Manget, Bibliothec. Chirurgic. vol. 1. pag. 92. from Ephemer. German. cent. 1. and 2. The end of the clavicle was laid bare, and rough and carious, in the cafe related by Le Dran, Obf. Chir. vol. 1. obf. 40. I felt the vertebrae rough and carious when I introduced my finger into the dilated aorta of a man who died from the burfting of an aneurifm in St George's Hospital, in the year 1752; this cafe is related by Dr Hunter in the firft volume of Medical Observations and Inquiries, published at London. Many more fuch cafes might be quoted.

bone carious, without laying it bare\*. Some people have imagined, that the caries of bones accompanying aneurisms was not produced in any of the manners just now mentioned, but that the blood served as a menstruum for dissolving the bony matter. Numerous cases, however, of ossifications † occurring in aneurisms,

\* Ruysch mentions two cases where the ribs were carious, although the cysts of the aneurisms were entire: Observat. Anat. 37. Du Vernoy gives us the case of an aneurism of the aorta, which had made pits in the vertebrae, which were lined with a membrane: Acta Petropolitana.

† Ambrou Paie tells us, that the internal surface of an aneurism of the *arteria venosa* was quite ossified: De Tumor. contra Naturam, lib. 6. cap. 20. The inside of an aneurism of the aorta was lined almost all over with long lamella, some larger, some smaller, like so many shells: Lafage in Phil. Transact. No. 267. De Haen says, he twice found aneurisms covered with bony incrustations on the inside, not continued over all the internal surface, but interspersed like so many little islands: Ratio Medend. part. 4. cap. 2. p. 15. Haller says, the external membranes of an aneurism of the aorta which he examined had a number of little scaly excrescences, the most part of which were ossified, or, at least, had a bony appearance: Opuscul. Patholog.

rifms, and experiments made with the blood on bones\*, are all repugnant to this opinion of the blood's being capable of dissolving and rendering the bones carious.

THE sides of aneurifmal sacs have been found in very different states. In the aorta, they have been found mostly  
firm;

cbf. 18. An observation of Mr Sharp's, (Surgery, chap. 36.), of the dilated aorta in the neighbourhood of the cyst being generally ossified, and of ossifications and indurations of the artery appearing so constantly in the beginning of aneurifms of the aorta, that it is not easy to judge, whether they be the cause or the effects of them, is just.

It may be worth while here to observe, that, in the two first cases of aneurifms I related above, there was no ossification; which shews, at least, that aneurifms may arise from other causes, if it does not make it probable, that ossifications are rather the consequences than the causes of such disorders.

\* Dr Pringle told me, that he digested bones in putrid blood, but did not find that the blood had the least effect in dissolving them as a menstruum. The stream of blood indeed, by perpetually washing the caries of bones laid bare by aneurifms, prevents the oily matter separated from the bones from stagnating and acquiring the strong foetid smell, and high degree of corruption, observed in other caries.

firm; in some, approaching to a cartilaginous nature; in many, covered with bony incrustations; in others, in a purulent corrupted state\*. They are not generally of equal thickness throughout, but for the most part thicker, though not much, than the sides of the aorta naturally are. In the case of John Parker, the sides of the cysts which remained entire, were nearly of the natural thickness

\* An aneurism of the aorta, at its curvature, where the coats were thick and cartilaginous: Lazar. River. cent. 4. obs. 34. The most internal or tendinous coat cartilaginous, and tending to bone, the muscular all ruptured or broke: Manget. Biblioth. Chirurg. p. 92. from Miscel. Curios. dec. 3. an. 9. and 10. In an aneurism of the aorta, which terminated where that vessel approaches the vertebrae, there were a great many ulcers: Haller Opuscul. Pathol. obs. 13. The sides of the aorta, at the dilated part, appeared five or six lines thick, (*i. e.* about half an inch); in the artery itself were many white, callous, scaly bodies, which seemed to be full of pus: *Ibid.* observ. 19.

The inside of most large aneurisms have been found covered with lamellated polypous concretions of blood, which many authors have either mistaken for coats of the cyst, or at least have called them by that name.

ness of the arteries. In the one which had burst and degenerated into the *mixed* kind, the sides of the cyst were thicker and firmer; in general, all aneurisms in this state, and all the *false* ones, like other incysted tumours, have their sides thick in proportion to their size.

II. ANEURISMS, which follow wounds, blows, violent strainings of the body, or other such accidents, probably often take their rise from a rupture of some of the proper coats, or of the cellular substance which connects them to the neighbouring parts, and serves by way of an outer covering; and from a dilatation of those coats, or part of coats which remain entire; for Dr Nichols' acknowledges, in the Philosophical Transactions, No. 402. that if air be blown forcibly into the pulmonary artery, the coat called muscular will yield and burst, and the external be dilated into a cyst; and, Dr Haller\*, in a memoir which he published

\* See Act. Societat. reg. Göttingen, 1755; and Memoire I. Sur le Mouvement de Sang, page 10. 1756.

published on the motion of the blood, tells us, that he has frequently, in living frogs, separated the arteries from the two lamellae of the mesentery, and from the surrounding cellular membranes, and found, that, as soon as he cut or wounded the artery, an aneurism was formed. It is not only confirmed by experiments and observations of this kind, that aneurisms may be formed in this manner, but likewise by cases which have occurred in practice. Caesar Hawkens, Esq; Serjeant Surgeon to his Majesty, told me, that, in performing the operation for an aneurism which had appeared after a wound in the fore arm, made with a small sword, had been healed for some months, he found the artery dilated into an oval cyst, like to that of tab. 1. fig. 1. N<sup>o</sup> 2. and not a cyst communicating by a small hole with the cavity of the artery, as is common. To be sure of not being mistaken, he opened the cyst; and, after having taken out a polypous concretion, he found the artery opening in-

to the upper end of the cyst, and continued again from its lower end, with an apparent continuation of the coats of the artery with those of the cyst, and performed the cure in the same way as if it had been one of the false incysted aneurisms.

AN erosion, or destruction of any of the coats of an artery, by pus or acrid matter of any kind, or such an obstruction or relaxation of any of the coats of an artery, as to render them incapable of resisting the force of the blood, may likewise give rise to such aneurisms.

III. THESE two species of true aneurisms may be complicated together; for, after an artery has been stretched to a certain length, some of its coats may give way, and the others which remain entire be dilated into a cyst. I once saw, with Dr Hunter, an aneurism of the aorta, of a man who had been a patient at our hospital, but had gone out of the house before he died; which had this appearance; the aorta was distended to several

times its natural size, from the heart to a little below its curvature; about an inch from the heart, in the right side, a cyst protruded from the aorta forwards, between two of the cartilages of the sternum; upon pressing this tumour with the finger towards the aorta, one felt as if there was a hole in the side of that vessel at the root of the tumour. Upon opening it, its cavity communicated with that of the aorta, and the membrane lining its inside seemed to be continued with the internal membrane of the aorta. However, I own, this case was doubtful; because the blood, when it forms a cyst in the cellular membranes, after the sides of an artery are burst, gives the internal membrane lining the cyst the appearance of being continued with the internal membrane of the artery; and this tumour had appeared some weeks before death\*.

THE

\* A case a good deal similar to this, but where the sac protruded backwards, we have related by De Haen.

THE cure of all those kinds of aneurisms is nearly the same.

WHEN they are situated in any of the large cavities of the thorax or abdomen, they are seldom known till such time as they have become so large as to be absolutely incurable, when the only thing left to be done is to endeavour to prevent their bursting, which is followed with immediate death, and to palliate those painful and uneasy symptoms which almost always attend them. This is to be attempted by moderating the force of the blood, when too great, by blood-letting, and a mild low diet; by avoiding every  
 thing

An aneurism of the aorta began at the heart, and was beset with a number of bony incrustations; at the back part of the beginning of the descending aorta, there was a hole the size of one's thumb, which opened into a large cyst which lay between the aorta and spine; this cyst was four inches long and two wide, and had raised the aorta from the spine, and separated the fourth and fifth ribs from one another, and protruded outwardly on the back into a cyst as large as one's fist; it was full of lamellated polypos concretions, and had had no pulsation for a considerable time. *Rat. Medend.* par. 4. cap. 2. p. 16.

thing that will increase the heat and momentum of the blood in the vessels; by keeping the belly loose by means of mild eccoprotics or laxatives; by deadening the pain with opiates, when severe; and by giving such other remedies as the circumstances of the patient may require, and which can be administered with safety. Handling or feeling and examining of such tumours with the fingers ought to be avoided as much as possible; for, in some cases, it may bring on an anxiety, giddiness, suffocation, or other troublesome symptoms; in others, it may so change the situation of the large polypous concretions, as to block up the passage through the dilated artery, or it may break off part of the polypous lamellae or filaments, and give rise to new obstructions; in others, it may be in danger of bursting the aneurismal sac. Gentle pressure, when the integuments come to be in danger of giving way, may preserve life for some time; but all strong pressure and tight bandages increase the  
 patient's

patient's misery, and hasten the progress of the distemper.

WHEN aneurisms are situated on the external parts, and are observed before they make any great progress, then something more may be attempted; for we know that varicous swellings of the veins have been removed; and, if Lancisi and other practical authors have not mistaken the disorders, aneurisms have sometimes been cured by a proper regimen and medicines. In such cases, if the patient labour under any venereal, scorbutic, or other disorders, we ought to endeavour to remove them by proper remedies, choosing such as can be given with safety under the present circumstances; and we must endeavour to allay the heat and momentum of the blood, and to keep the body cool by the means proposed immediately above in the cure of internal aneurisms; at the same time that astringent and discutient fomentations are applied, and a proper compression is kept on the part. When such a-

neurisms

neurifms grow large, then the means here proposed can have no effect in making a cure, and the only method left is to apply a tournequet nearer the heart than where the tumour is, so as to stop entirely the circulation in the part; to make an incision, and lay bare the artery in the middle of the fore part; to open the cyst, and evacuate its contents; to tie the artery above, and likewise below where it is dilated, to prevent bleeding from any anastomosing branches that may open into the artery further from the heart than where the first ligature is made. It may not be amiss in making these ligatures, where the situation of the dilated artery will admit of it, to follow the directions given by my father\* for performing the operation in the false aneurifms of the arm, viz. to take hold of the artery with the thumb and fore-finger of the left hand, pinching it towards the back part, and drawing it gently outwards at the same time, and then to push  
the

\* See Edinburgh Medical Essays, vol. 4. art. 17.

the needle close upon the nails, so as to shun any nerves that may lie near the artery; after having made the ligatures, it is to be treated as any other wound. This operation can almost only be done in the extremities, and in the branches of the temporal artery. When indeed the tumour is situated in the neck, and the swelling does not extend much upwards or downwards, an operation may be attempted; for we know that an animal will live after one of its carotid arteries is tied. However, the difficulty of making a proper compression, and the danger of cutting these parts, will deter most cautious surgeons from attempting the operation when the aneurism is situated here\*.

WHEN an aneurism is so situated in any of the extremities as to admit of an operation, I would not advise the surgeon to

\* An aneurism of the carotid artery appeared some time after a wound of the neck with a sword; a surgeon attempted to cure it by operation; but, not being able to make a sufficient compression, the patient died of an haemorrhage immediately. Harder. Observ. Pract. observ, 86.

to proceed immediately to the amputation of the extremity, as is directed by many, provided there be no carious bone, or other disorder that requires it; for we find, by repeated operations that have been performed for false aneurifms in the arm, that, although the trunk of the humeral artery be tied, yet the lateral branches are capable for the most part of being so much dilated, as to carry on the circulation, and nourish the arm. The same thing may happen in the lower extremities, when the crural artery is tied. And, therefore, where aneurifms are situated any where below the middle of the arm or thigh, the surgeon ought only to tie the artery above and below the aneurifmal sac, to open the cyst, and evacuate its contents, and to treat it otherwise like an incysted tumour, and wait to see what nature will do; having, as Mr Sharp advises, a tournequet, and proper instruments, and dressings, for amputations ready, in case it should prove requisite to proceed so far.

ALL aneurifms in the extremities will not admit of fuch operations; for, if they be fituated, either in the groin, and afcend high towards the abdomen, or, if they protrude from below the clavicle, it may be unadvifable to attempt any operation.

## P A R T II.

### *Of false or fpurious Aneurifms.*

THE *false* or *fpurious* aneurifms are of two kinds; the one, where the blood is diffufed through the cellular membranes; the other, where it is contained in a cyft or bag. Both proceed from the burfting or wounding of fome particular artery, or of a true aneurifm; the one is called the *diffufed*, the other the *incysted*.

I. IN the firft, the blood is often diffufed in great quantity through the cellular

membranes, and sometimes has a strong pulsation, as happened in that case related by Severinus\*, where there was a great quantity of blood extravasated among the muscles of the thigh; at other times the pulsation is but weak, or scarce to be perceived.

THE only cure in such cases, where the artery is large, is to apply a tournequet, and make such a compression as to stop the circulation in the part, to lay bare the artery, and put a ligature round it, both above and below where it is wounded or ruptured, and to make incisions into the cellular membranes for the evacuation of the extravasated blood. An old man who had been blooded in the basilic vein, was thought to have an obstinate thrombus at the part where the puncture had been made, and was allowed to use the arm freely. After some weeks, all that arm, and a considerable part of the fore-arm, swelled suddenly to a great size. This was treated as a tumour of the inflammation.

\* M. Aurel. Severn. de Effect. Medicin lib. 1. part. 2.

inflammatory kind, by blood-letting, emollient fomentations, &c. till Mr Monro, surgeon to his Majesty's military hospitals in North America, was consulted, who immediately knew it to be a diffused aneurism, and performed the operation just now described, taking out of the cellular substance, in which the large vessels and nerves of the arm lie, several pounds of coagulated blood. For six days after the operation, every thing had a very favourable appearance; but at last a gangrene came on the patient's buttocks, which continued to spread, notwithstanding the use of the bark, and other proper remedies, till it put an end to his life\*.

#### WHERE

\* The diffused aneurism of the thigh mentioned above from Severinus, was occasioned by a gunshot wound; after forty days, an incision was made into the thigh, and six pounds of grumous coagulated blood taken out; the artery was tied both above and below the aperture through which the blood was discharged, and in six weeks the patient had the full use of his thigh and leg, and was perfectly cured.

WHERE the artery is but small, such a compression kept on the artery as will stop the circulation in it, and incisions made through the skin and cellular membranes, to allow the extravasated blood to be evacuated, may sometimes be sufficient.

THIS species is most likely to happen where the wound or hole in the artery is at first considerable ; for it generally makes a rapid progress. It may too, sometimes be occasioned by the sudden bursting of the sacs, either of the true or incysted aneurisms, without any rupture of the skin.

II. IN the other kind, or the *incysted* false aneurisms, the blood from the artery is collected in a cyst formed by the cellular and other membranes, and aponeurosis, which happens to lie above the artery, drove close together. This species of aneurism most commonly begins after a wound or puncture, where either the coats of the artery have been quite cut through, but the haemorrhage has  
 been

been stopped by means of bandages and compresses till the lips of the external wound were firmly united; or where the coats of the artery were so injured, tho' not cut through, that they were not able to resist the force of the blood, but gave way after the external wound was healed.

THIS kind is most likely to happen where the hole in the artery, or the injury done it, is at first but small; for its progress is commonly slow and gradual. It most frequently comes after bleeding at the arm. Such aneurisms were commonly reckoned among the true ones, and were thought to take their rise from some of the coats of the artery being cut through, and the others being distended into a cyst; but later experience has shewn, that in general such aneurisms as follow bleeding, even though they have not appeared till some time afterwards, are of the false or incysted kind. For, in most of the cases where the operation has been performed for this kind of aneurism, after opening the cyst, and removing the grumous or polypous concretions,

cretions, the artery has been found lying in the bottom of the cyst with a small hole in its side\*, which could not have happened had the cyst been formed of the proper coats of the artery. The case, however, of the true aneurism related above, which followed a wound of the arm, and was under the care of Mr Hawkins, shews the possibility of true aneurisms following such accidents.

THIS kind of aneurism may not only proceed from external wounds, but likewise may be occasioned by violent strainings and efforts of the body rupturing particular arteries; or by pus, or other acrid matter, eroding or destroying the tone of their coats, as seems to have been the case in that aneurism of the aorta of which Dr Pringle has given an account above.

WE

\* The artery was found in this state in all the cases of such aneurisms related in the Edinburgh Medical Essays, vol. 2. and 4.; in the Memoirs of the Academy of Surgery at Paris, vol. 2.; in De Haen Ratio. Medend. part 4. capt. 2.; in two or three cases where I was present at the operation; and in all the cases I have found related by the authors I have looked into.

WE not only meet daily with instances of ruptures of arteries from violent strainings of the body, and have several histories related of aneurifms proceeding from such cases, but find, that the large veins, and even the heart itself, may be burst. In dissecting a body at Paris, with Dr Drummond Physician to the Royal Infirmary at Edinburgh, we found the pericardium vastly distended with blood; and, upon searching for the vessel which had discharged it, found a hole in the right ventricle of the heart, near the apex, capable of admitting the little finger; but we could not afterwards learn the history of the person. On the 28th of October 1749, a soldier of the regiment of dragoon guards, about twenty-three years of age, of a strong make, and seemingly in good health, after assisting to lift some very heavy boxes into a waggon that was going from Berwick to Belford, was seized with a kind of a fit, attended with a giddiness, sickness, and inclination to vomit, and was immediately

diately carried to his quarters ; his countenance looked bloated, his breathing was not much altered, except that it was sometimes interrupted with spasms, which seemed to throw him into great agonies ; he complained of a sense of cold, and there was a total cessation of the pulse of both the heart and arteries. On the 29th he was much in the same way, complained of a pain in his left side, and of a sense of something rising in his throat, but was able to walk about the room, and had some stools. On the 30th, in the morning, he still remained in the same way, but died suddenly that day. Upon opening the body, the pericardium was found immensely distended with blood, the heart was squeezed and contracted to a small size, and, just above the right auricle, the sinus of the *vena cava* was ruptured about the length of an inch\*.

THE

\* This history was given to me by Dr Thomas Young of Sheffield soon after the accident happened, in the same form as sent to him by the surgeon of the regiment who attended the patient.

THE incysted spurious aneurism, appears first in form of a small beating tumor, which gradually increases in its size; in the beginning it may be made to disappear by pressure, but afterwards, when the blood has concreted in the cyst, this cannot be done; when the tumor is once greatly enlarged, the pulsation often ceases, in the same manner as in the other species of aneurism; and in this kind the coats turn thicker as the swelling enlarges, in the same manner as happens to all incysted tumors.

WHEN these false aneurisms are small, we may attempt at first to cure them without any operation, provided the tumor can be made to disappear by pressure. To effectuate this, we ought to endeavour to moderate the force of the blood by bleeding, and a cooling regimen, at the same time that such a compression is kept on the part by means of proper compresses and bandages as prevents the blood from flowing into the cyst; and this compression is to be continued not only till the tumor disappears, but like-

wife for some time after, otherwise there will be danger of a relapse; and if it has come after bleeding at the arm, the patient ought not to use his arm freely for a considerable time afterwards. Mr Foubert, in the second volume of the memoirs of the academy of surgery at Paris, gives two or three instances of cures of aneurisms from bleeding being made in this way; and we have the case of an old woman related by De Haen \*, where the same attempt was made; but they were not able to remove the tumor: However, after two months, it had lost its tremulous motion, and only a hard immoveable lump, which seemed to cover the orifice of the artery, remained; it gave no uneasiness, and the woman afterwards had the free use of her arm †.

WHERE

\* De Haen ratio medend. part 4. cap. 2. p.

† A surgeon of eminence, whose veracity may be entirely relied on, told me of a practice (scarce heard of in this country) which they have in Portugal, of keeping ice constantly applied for a considerable time in order to discuss such tumors; and assured me, that a  
young

WHERE such aneurifms are large, and of long ftanding, this method can have no effect. Mr Foubert \* fays, that, under fuch circumftances, preffure only ex-ulcerates the fkin, and makes the bag or cyft open fooner, and perhaps fuddenly, when the patient has no proper affiftance near to ftop the haemorrhage which neceffarily follows.—Bleeding, and a low regimen, by leffening the force of the blood, may prevent their rapid growth, but cannot be expected to make a cure. In fuch cafes, no compleat cure can be made without an operation ; and, where the tumor is fo fituated as to admit of this, it ought to be performed. In doing this operation, a tournequet ought to be applied between the tumor and the heart, fo as to put an entire ftop to the circulation in the part ; the cyft is to be opened, and

young gentleman, fon to a Lisbon merchant, told him, that he himfelf had been cured by this means of an aneurifm, which had come after bleeding in his arm ; and the gentleman's father confirmed the account given by the fon.

\* Mem. de l'Acad. de Chirurgie, tom. 2. 4to edit.

and its contents evacuated; a ligature is to be made above, and likewise below the orifice in the artery, to prevent bleeding from any anastomosing branches, and then the wound is to be treated in the common way. Where such aneurisms are the consequences of blood-letting at the arm, the directions for shunning the nerves, as I have already mentioned, when describing the operation for the true aneurism, ought to be followed. On some occasions the artery, after being laid bare, may be raised from the nerve, by a probe introduced into the hole of its side, as is also advised by my father\*. This precaution of shunning the nerve, if possible, ought never to be omitted; for, in the cases related in the *Commentaria Bononiensia*, and in two where I knew the nerve was tied in with the artery, the patients had not so free use of their arms, as those had in whom the nerve was shunned. After the artery is tied, the wound is to be filled with soft lint, and proper compresses and

\* Med. Ess, vol. 4.

and bandages applied, and a suppuration is to be promoted.

IT has been found, that, although the trunk of the humeral artery has been tied, and there has been no pulsation in the wrist immediately after the operation; yet in one, two, three, or four days, the pulse has returned, and the patients have recovered the free use of their arms. It may, perhaps, be of use here to observe, that, after the operation for the incysted spurious aneurism, where the opening into the cavity of the artery is small, and consequently the two ligatures are near to each other, there is less chance of an hæmorrhage, than there is after the operation for the true aneurism, where the ligatures are at a greater distance. For, the longer the artery is between the two ligatures, the greater number of lateral branches arise from it, and the greater chance there is of their anastomosing with the branches which have come off from the trunk of the artery above or below the diseased part. Bandages, therefore, applied so tight as to stop the blood from return-

ing

ing freely, may cause it to regurgitate by any branches that come off from the diseased part, and communicate with those which arise from the artery above, and by this means occasion an haemorrhage, which will stop of itself on loosening the bandages, as seems to have happened once in the case related in *Medical Effays*, vol. 2. art. 15.

As surgeons have been afraid of a mortification following the tying the trunk of the humeral artery, it has been proposed to cure such aneurisms without making any ligature, by laying the cyst open, evacuating its contents, and then, by means of compresses and bandages, to stop the bleeding till the orifice in the artery and the external wound are healed. Hambergerus, in the year 1732 \*, gave an account of a case cured by these means in the preceding year. Dr Trew †, in the 1748, gave another; and since then we have had several such related in the memoirs of the French academy of surgery,

vol.

\* *Commerc. literar. Norimberg. 1732. p. 107.*

† *Ephemerid. nat. curios. vol. x.*

vol, 2. by Mr Foubert and Mr Morand, which were cured in the same way; and, in one or two of them, the agaric was used with success.

WE are certain that wounds in arteries can be cured in the same manner as those made in veins, as we daily see happen in bleeding at the temporal artery; and Mr Middleton, surgeon general to his Majesty's army, told me, that, about 20 years ago, he had been twice called to stop hæmorrhages from arteries of the arm which had been opened by mistake for veins; that in both he had stopped the bleeding by means of compresses and bandages applied above the humeral artery, and had cured both without making any ligature.

### P A R T III.

*Of the different Arteries which have been found dilated into aneurismal Sacs, or ruptured.*

HAVING thus taken a general view of aneurisms, it may not be improper, before  
we

we leave the subject, to inquire in what parts of the body the different kinds have been observed.

FROM the histories we have of aneurisms, it is not easy to determine exactly what were true ones; for, although hundreds of authors mention them, yet the accurate histories of them are but few. Most authors, till of late, only tell us, that they found a cyst filled with blood, which had a pulsation during the patient's life; sometimes adding, that the cyst was a dilatation of the aorta, or some other vessel: And most of the later writers content themselves with describing the external appearance of the aneurismal sac, without having dissected its coats, to determine exactly in what state they were. But since, from the account of an aneurism of the aorta given by Haller, and from the history of the dissection of four of the aneurismal sacs in the case of J. Parker, we are fully satisfied of the existence of true aneurisms (in the strictest meaning of the words), I may take the liberty of classing under this head all those aneurisms where  
the

the coats of the found artery are said to have been continued with the substance of the aneurifmal sacs.

ALL the arteries of the body certainly may be dilated into aneurifmal sacs, when subjected to the causes capable of producing them.

AUTHORS mention true aneurifms in the brain; but, I have met with no account of any within the skull, in such books as I have consulted. Indeed, in the *Acta Haffniensia* \*, there is mention made of an aneurifm in the head; but the head was not opened after death, nor is there any proof of the disease being an aneurifm; it seems rather to have been a supuration within the skull.

ÆTIUS, Fernelius, Parè, and a great many other authors, mention aneurifms being frequent in the neck; but Heister † very justly remarks, that this has not been found conformable to observation. A-

\* Vol. 1. art. 78

† Instit. chirurg. vol. 1, cap. 13. not. d. 429.

tius \* himself seems to have pointed out from whence this mistake has probably arisen ; for he says the dilatation of the vessels there produces that sort of tumor called “ Bronchocele.” In practice, we daily meet with tumors which go by this name, which have a strong and evident pulsation resembling that of aneurisms, for which I have more than once mistaken them, till I examined them more narrowly. These tumours are generally produced by a swelling of the thyroid gland which is supplied with a large artery on each side ; and, when they become large, they likewise often press more or less on the carotid arteries, and are affected by their pulsations. But, altho’ aneurisms of the neck are not frequent, as many of the older authors alledge, yet they have been sometimes seen in this part ; as the observations related by Mr Littre in the Memoirs of the Academy of Sciences, and by Dr Dod in the Philosophical Transactions, of processes from the  
dilated

\* Art. medic. princip. Aetius Tetrab. 4. ferm. 3. cap. 10.

dilated curvature of the aorta, protruding up towards the throat; and the cases of aneurifms of the carotid artery related by Haller and Mangetus \*, and of one by Harderus †, which appeared some time after a wound in the neck, evidently shew.

THE subclavian and axillary arteries have frequently been distended and enlarged into aneurifmal sacs. Van Swieten ‡ gives an account of a large one in the right subclavian artery, the first symptoms of which had appeared after a severe blow on the breast. Not only the aorta, but the right subclavian artery, was dilated in the case related in the *Hist. de l'Academ. des Sciences* 1700, and in the one mentioned by Guattan, *ibid.* 1750. Pannarolus Romanus § gives an account of the axillary artery being dilated; and, in the  
case

\* Opuscul. patholog. obs. 4. Manget. Biblioth. chirurg. lib. 1. p. 88. vol. 1. *Ibid.* p. 80.

† Observ. anat. pract. obs. 86. p. 324.

‡ Comment. in § 176. Boerhaav. aphorism. tom. 1. p. 288.

§ Pentacost. 2. obs. 11.

case of Thomas Cook, the axillary artery opened into a large cyst, and seemed originally to have been a true aneurism.

ALTHOUGH true aneurisms of the arm are so much talked of, and most authors till of late mention those which have followed bleeding or wounds of the arm as true ones: Yet I have not in them met with one accurate account, where the aneurismal sac was found to be a dilatation of the artery; so that the one narrated above which appeared in the fore arm, sometime after a wound with a small sword, where Mr Hawkins performed the operation, is the only well vouched one I know of. For all the cases mentioned in the Medical Essays, and in the Memoirs of the academy of surgery, and in other books, were false incysted aneurisms, excepting one, which was of the mixed kind, in which Mr Morand \* says he not only found the artery perforated, but likewise dilated to double its natural size.

THE

\* Mem. de l'Acad. de Chirurg. vol. 2. 4to.

THE number of cafes related of true aneurifms of the aorta near the heart, are almoft equal to, if not greater than, thofe obferved in all the other parts of the body together. We have cafes of this kind in the Philofophical Tranfactions \*; in the Memoirs of the Academy of Sciences at Paris †; and, in the other collections of this kind in the different parts of Europe; befides thofe given by Riverius ‡; by Severinus §; by Bonetus \*\*; by Ruyfch ††; by Lancifì ††; by LeDran §§; by Haller \*\*\*; and an infinite number of other authors, in moft of which the  
 aorta

\* No 265. by Mr La Fage. No 402. by Dr Dod.

† Littre, in the memoirs for 1707 and 1712. Morand in ditto for 1721. Maloet in ditto for 1733. By a furgeon in the hift. of ditto for 1700. Guattan. in ditto for 1750.

‡ Obferv. cent. 4. obf. 3.

§ De noviffim. abfcess. cap. 34. 35.

\*\* Lib. 4 § 2. de tumor. p. n. § 7.

†† Obf. anat. chirurg. Cent. obf. 37. and 38.

†† De aneurifm. prop. 21. and 22.

§§ Obferv. de Chirurg. vol. 1. obf. 40.

\*\*\* Opuscul. Pathol. obf. 18.

aorta has been found dilated at its curvature, in some to an immense size capable of holding one, two, or more pints, with its coats in some firm, hard, cartilaginous, or even bony, not much thicker than natural; in others, thicker at one part, and thinner at another; in others, two or three times the natural thickness of the aorta. Many of them protruded either forwards towards the sternum, or upwards on the inside of the clavicles toward the neck, in form of a pouch or oblong tumor; others pointed towards the back. Most of them at last burst, and the patient died of the haemorrhage. The one mentioned by Maloet, burst into the *trachea arteria*, and suffocated the patient; and we have the case of one which burst into the cavity of the thorax related by Mangetus \*; some of them so disturbed the animal functions, and stopped the circulation, as to put an end to life before they broke. And, in the case related by Mr Le Dran, the patient's life

seems

\* See his Biblioth. chirurg. vol. I.

seems to have been sooner put an end to, than otherwise it would have been, by a pressure made unjudiciously on the external tumor; from whence Mr Le Dran takes occasion to observe, that, in such cases, external pressure does not assist the cure, and is made at the expence of the parts below; that it fatigues the patient, and often hastens death.

FROM hence I think that Dr Freind \* and Dr Douglas † are certainly in the right, when they observe that the curvature of the aorta is more frequently dilated than any other vessel of the body, owing probably to the force of the blood and the resistance it meets with being greater at this part than at any other, and to this vessel being more apt to be gorged with blood, and overstrained whenever there is a stop put to the free circulation in any of the large vessels, by any violent effort of the body.

THE inferior parts of the aorta, and the large vessels within the abdomen, are

not

\* Hist. medicin. in vita Pauli.

† De Peritonæo,

not exempted from such accidents. Lancisi \* quotes a case from Fontanus of an aneurism of the aorta situated immediately above the iliacs. And we have a like one in the *Histor. Morbor. Uratislav.* 1701 †. Severinus ‡ mentions one of the cæliac artery.

THE pulmonary vessels too have been found dilated; for Ambrose Parè § gives the case of an aneurism or dilatation of the *arteria venosa*, where the internal coat was degenerated into a bony nature.

THE intercostal arteries have been found distended into large cysts, if authors have not mistaken the false for the true aneurisms. Ruyfch \*\* says he has seen one of the intercostal arteries distended to the size of a hen's egg, and wonders how such a small vessel could be so much dilated;

\* De aneurism, prop. 38.

† Page 28.

‡ De novissima. abscess. cap. 34. § 5.

§ Oper. de tumor. cont. natur. lib. 6. cap. 23.

Blancard calls this the pulmonary vein; Castelli, the artery.

\*\* Thesaur. anatom. 9. No 5,

lated ; but adds, that he has seen this happen three or four times.

THE arteries of the thigh may certainly be dilated ; the case of J. Parker is a plain proof of this ; besides, many others related by authors. Mangetus \* gives an account of a large aneurism in the middle of the thigh which came after a violent strain. De Haen † says, that Boerhaave was consulted by a student for a large one of the knee which then had no pulsation ; Boerhaave advised him never to allow it to be opened ; but he neglecting this advice, suffered for his folly.

THE arteries of the leg have been found enlarged. We have an account of one of these arteries being greatly dilated in Mangetus's *Bibliotheca Chirurgica* ‡. The case related by Dr Freind was certainly a true aneurism in the beginning, though it had degenerated into the mixed kind before the patient died § ; as was likewise

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the

\* Bibliothec. chirurg. lib. 1. p. 30.

† Rat. medend. part 4. cap. 2.

‡ Biblioth. chirurg. lib. 1. p. 93.

§ Hist. medicin. in vita Pauli.

the one quoted by him from Van Horne, where the artery was found dilated to six times its natural size at the part where it had burst.

FALSE aneurisms both diffused and incysted have followed wounds and external injuries in all the parts of the body; and it is needless to be particular in relating cases of them. In the Medical Essays, in the Memoirs of the French Academy of Surgery, and in other books, we have vast numbers of cases which followed bleeding at the arm. Tulpius \* mentions one, which followed a wound between the thumb and fore finger, which was cured by compression. Thomas Bartholin † gives an account of a large one which came after a blow on the left side of the head, which was cured by opening the cyst and tying the ruptured vessel. I saw a small one on the temples cured by the same means. Albinus ‡ gives an account  
of

\* Observ. lib. 4. observ. 17.

† Observ. et epistol. cent. 3. epist. 53.

‡ Lib. 3. anotat. academ.

of one of the penis, from its being suddenly and inadvertently bended when erected, and afterwards treated injudiciously by emollients; and we have in the *Miscel. lan. Curios. A. N. C.* 1674, the case of one in the thigh from a ruptured artery.

MR FOUBERT, in the 2d volume of the *Memoirs of the Academy of Surgery*, tells us, that he had an opportunity of dissecting the arms of two persons whom he had cured of the spurious incysted aneurism of the arm, without making any ligature; and says, that, in both, he found a little hard knot, and the aponeurosis of the arm growing firmly to the artery at the part where it had been opened. Upon opening the artery on the opposite side, he observed the little hole of the artery firmly plugged up with a piece of coagulated blood; upon removing of which, he saw the aponeurosis grown firmly to the outer side of the artery.

ART.

## A R T. XIII.

*An Attempt to determine by Experiments, how far some of the most powerful Medicines, viz. Opium, ardent Spirits, and essential Oils, affect Animals by acting on those Nerves to which they are primarily applied, and thereby bringing the rest of the Nervous System into Sufferance, by what is called Sympathy of Nerves; and how far these Medicines affect Animals, after being taken in by their absorbent Veins, and mixed and conveyed with their Blood in the Course of its Circulation; with Physiological and practical Remarks; by Dr ALEXANDER MONRO, Physician and Professor of Physic and of Anatomy in the University of Edinburgh\*.*

**H**AVING formerly endeavoured to show, in an Essay on the Valvular Lymphatic Vessels, that the matter of many diseases is absorbed by these vessels, and  
conveyed

\* Read 1761.

conveyed with the blood, before it produces its effects, I was naturally led to consider, how far Medicines operated in a similar way; and I was the more encouraged to attempt this subject, that the disagreement to be met with among the best writers on it plainly proves they are far from sufficiently evincing the truth of their opinions.

THE method pursued in the following experiments, is, first, To observe what effects each medicine, applied in various ways, can produce on an intire animal.

NEXT, a stop is put to the circulation of the blood before applying the medicine; by which means we discover, how far its effects on the intire animal were owing to its action on those nerves to which it was primarily applied.

LASTLY, The nerves of some particular part of the body are cut or destroyed; after which, applying the medicine to that part, we learn how far its effects were owing to its absorption and mixture with the blood.

BUT,

BUT, as these experiments are made on frogs, it may be necessary, before entering upon the particular detail of them, to obviate a doubt, which, to some, may present itself, concerning the propriety of applying to the human body experiments made on any other animal, especially on one that differs much from man in its way of life, considering the more sudden and greater effects certain medicines are observed to have on some species of animals than on others.

WERE I to suppose the effects of medicines on different animals to agree in every circumstance, my conclusions would be justly questionable.—But I am far from attempting to make the application in this way. I am sensible that the effects of a medicine may be much more speedy and violent on one species of animals, than on another, owing to the different degrees of delicacy of their frame in general, or of that particular part to which the medicine is applied. So that all I contend for is, that, if two species of animals,

mals,

mals, provided with like systems of nerves and vessels, suffer in a similar way from the application of the same medicine; and if this medicine can be proved to affect the one species solely through the nerves to which it was primarily applied, or solely after being absorbed and mixed with its blood; it may be supposed to affect the other in the same manner.—Which supposition, I imagine, will be readily admitted, especially if it is considered, that the effects of the same medicine applied to delicate and robust persons are often as unlike, as where it is applied to two different species of animals.

*Some preliminary Facts referred to in the following Essay, the truth of which I have sufficiently ascertained by repeated Experiments.*

1. THERE is but one auricle and one ventricle in the heart of a frog; and only one artery arising from the ventricle, which supplies the air-vesicles or lungs, as well as the rest of the body.

2. THE

2. THE ventricle of the heart of a full grown frog contracts about 58 times in a minute.

3. AFTER the ventricle of the heart is cut off, the animal can move about, for an hour, and is evidently sensible of injury for half an hour longer; though the motion of the blood ceases, in the small vessels, as soon as the heart is cut out.

4. If the circulation is stopt in the hind legs only, the animal can move them above an hour and a half, and is very sensible of injury done to them for four hours.

5. THOUGH all the nerves of the hind legs be cut, or the posterior half of the spinal marrow from which they rise be destroyed, and the whole hind legs be instantly rendered insensible and motionless; yet the rapidity of the circulation of the blood in the feet is not observably lessened after several months, and the absorbent vessels, after that time, greedily take in fluids applied to the skin.

6. THOUGH the brain and spinal marrow, or origin of all the nerves, be destroyed; yet the heart continues to be dilated

lated and contracted alternately for several hours, and the frequency of its contractions decreases very gradually; but then its force is instantaneously so greatly impaired, that the blood ceases from motion in the vessels of the feet.

*Experiments with Opium.*

So long ago as the year 1754, I had found, by experiments, that a solution of opium applied to the skin of frogs, rendered them motionless, and killed them, in the same way as when applied to their interior parts \*. From which it was evident, that, if opium acted on animals solely by affecting those nerves to which it was primarily applied, and the rest of the nervous system by sympathy, inde-

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pendent

\* Dr Alston had before that found, that, if a frog was put into water in which opium was dissolved, it died before next morning; but, in this way of making the experiment, the water with the opium might enter the mouth, or its effluvia the nostrils, &c. See the Med. Ess. vol. 5. art. 12.

pendent of the circulation of the blood, (as Drs Jones, Alston, Van Swieten, and Kaaü Boerhaave \* had endeavoured to prove)

\* Dr John Jones, by telling us in some places, that the urine and sweat smell of opium, after taking that drug in considerable quantity, allows, that it enters the blood; yet, from the small proportion it must bear to the whole mass, denies, that, in that way, it can remarkably affect the œconomy; and says, “It is past all doubt, that opium produces its common effects, while it is in the stomach, and before it arrives at the blood, and therefore does not operate as an alterative thereof.” See Jones’s *Mysteries of Opium revealed*. Chap. 12. p. 93. and 94.

Alston in *Med. Eff.* vol. 5. art. 12. § 12. N. 1. and 2. p. 140. 4. Edinburgh. “I infer, therefore, imo, That the anodyne and hypnotic virtues of opium do not depend on its action on the brain, or on the blood, whether externally or internally used.

“2do, That it affects first and principally the nerves to which it is applied; next, such as are more immediately connected or communicate with them; then those which serve for sensation and voluntary motion; and, last of all, by consent, the whole nervous system.”

Van Swieten C. in B. § 229. n. 2.

“Unde (opium) non videtur agere, quia solutum et humoribus mistum circulationis lege ad cerebrum deferatur, sed quia interiori ventriculi superficiæ applicatum manet.”

prove) the most distant nerves in the body could suffer from its application, and bring the rest of the nervous system to sympathize: And hence it followed, that the effects of opium did not depend on a singular sympathy of the rest of the body with the stomach, as Willis, Van Swieten, and other authors seem to imagine.

BEFORE that time, and more fully since \*, Dr Whytt has endeavoured to determine several particulars respecting the manner in which opium affects animals, by a variety of ingenious experiments, some of which are much more decisive than any formerly proposed. But, from an unlucky deception, in the chief of his experiments, the Doctor was necessarily led to ascribe too much to the effects of  
the

Abrah. Kaa Boerhaave impet. fac. § 433. "Adeo  
" quidem, ut illa (scilicet narcotica) intacto corpore, nisi  
" in superficiei externa, suas exercent potentias." Nay,  
this author expressly affirms, that opium taken into the  
alimentary tube prevents the lacteals from being filled:  
Hence he was led to deny, that opium affected animals  
by being absorbed.

\* Dr Whytt on vital and involuntary motions 1751.  
P. 375, and in Ess. Phys. and Lit. vol. 2,

the opium on the nerves to which it was primarily applied, and to the sympathy of the other nerves with these; and a great deal too little to its absorption and mixture with the blood. And it must be confessed, that appearances might indeed very readily mislead one here.

FOR, after destroying the brain and spinal marrow of a frog, the Doctor observed the heart to continue to beat for several hours, and the frequency of its strokes to decrease but very gradually. "Yet," says he \*, "after decollation and the destruction of the brain and spinal marrow, opium operates much more slowly in frogs, than it does when the animals are intire: And hence it follows, that it must produce its effects chiefly, if not wholly, by its action on the brain, spinal marrow, and nervous system."

FROM which he appears to take for granted, that the absorption and circulation are no more influenced, by the destruction

\* Dr Whytt, in *Essays Physical and Literary*, vol. 2.

struction of the brain and spinal marrow, than is the frequency of the strokes of the heart; and that, as he had found the nerves continue to be affected by opium after the heart is cut out, so he supposed that, after the brain and spinal marrow are destroyed, the veins continued to absorb the opium, and mix it with the blood, and that the heart continued to circulate it through the body. Whereas, I find, by the assistance of the microscope, what indeed I suspected to be the case, that, although the heart acts even more frequently than is natural to it immediately after destroying the brain and spinal marrow, and continues for nine or ten hours to contract half as frequently as in health; yet its force is instantaneously so extremely impaired, that the blood in the small vessels ceases from motion. And I have further found, by other experiments, that in the frog the absorption becomes very inconsiderable when the circulation ceases. So that Dr Whytt's experiments, from which he attempts to determine how far  
 frogs

frogs are affected by the absorption of opium and its circulation with their blood, being unluckily performed on them after there was little or no absorption, and the circulation of their blood had intirely ceased, he was led to conclude, contrary perhaps to what a person of his knowledge and penetration would, without such a deceitful experiment, have done, that the effects of opium in that way were altogether inconsiderable, when compared with those occasioned by its action on the nerves to which it is primarily applied.

HENCE, although the Doctor has first given unquestionable evidence of the surprising effects which opium has, independent of the circulation; yet he has by no means proved that opium has no effect, or only a very inconsiderable one, in a sound animal, so far as it is absorbed and mixed with the mass of blood.

EXPER-

EXPERIMENT I. (*Two Trials*).

THIRTY drops of a solution of opium in water \* were poured through a tube into the stomach of a frog. — After four hours it was somewhat stupified, and, if touched, though in the slightest manner, cried or sobbed, in a way which I have observed this animal to do only when affected with opium; still, however, it could leap with force; nor was the rapidity of the blood in the hind feet sensibly lessened. After ten hours, the motion of the blood was less rapid; but still it could leap. After 22 hours, the blood had almost ceased from motion; and, in one hour

\* The solution used in this, and all the following experiments with opium, was prepared by accurately mixing a drachm of opium with an ounce of cold water in a mortar, and after one day's digestion filtrating the clear part of the mixture. And I may here, once for all, observe, that my experiments are made on full grown frogs, unless where it is otherwise specified; and that, where the same experiment was repeatedly tried, I describe the mean result of it.

hour more, it lay with its legs extended, and all its muscles almost incessantly convulsed. After 26 hours, it did not discover outwardly any sign of life; its heart alone continuing to move feebly for several hours longer.

EXPER. II. (*Two Trials*).

THIRTY drops of the solution were poured into the anus of a frog. After an hour and a quarter it cried when touched, and, in a quarter of an hour more, was extended and convulsed. After two hours and a half it shewed little outward appearance of life; and the blood had ceased intirely from motion in the feet. The heart, however, was found to contract feebly about 18 times in a minute, and continued to move several times in a minute, for eight or nine hours longer.

EXPER.

EXPER. III. (*One Trial*).

THIRTY drops of the solution were applied on scraped linen to the hind legs. After 24 hours, the animal was observably stupified. After 26 hours, when touched, it cried, and jumped with less force; but, after 48 hours, was not convulsed nor extended.

EXPER. IV. (*From five Trials*).

ABOUT a hundred drops of the solution were applied on scraped linen to the skin of the belly and hind legs. After two hours, the animal began to be convulsed and extended, and the blood had intirely ceased from motion in the hind legs. After three hours, it was more violently convulsed and unable to move its body out of the place where it lay. After five hours, it shewed no outward sign of life; and, though the solution was removed, and the legs washed, the animal did not recover.

## R E M A R K S.

1. HOWEVER different the appearances in the above experiments may seem, at first sight, from the ordinary effects of opium upon man and quadrupeds, of rendering the muscles more inert; yet they will be found analogous to its effects when given in so large a quantity as to kill; of which see proof, in the learned work of Dr Tralles on opium. S. 1. Exp. 10. p. 118. 119.

2. THE animal is affected in the same way, and to the same degree, whether the opium is applied inwardly or outwardly.

3. THE effects are, however, more speedy, where the dose is equal, when the opium is applied inwardly, than when applied outwardly; as might have been presumed from the greater sensibility and delicacy of the inward organs. And in us, from the greater proportional hardness and compactness of the skin, the difference will probably be still more considerable than in the frog.

EXPER. V. (*Three Trials*).

IT being commonly believed that opium affects more the whole member to which it is applied, than the rest of the body, I put this notion to the test of the following experiment.

ABOUT 50 drops of the solution were applied on scraped linen to one of the hind legs of a young frog. After three hours the blood was found to move much slower than natural; and, soon after, the animal began to be shook with convulsions. Within half an hour more, it was violently convulsed and extended, and unable to move from the place where it lay; and the blood in the vessels of the hind feet had lost its motion.

DURING the above period, I removed the opium from time to time, and forced the animal to move about, without observing that it lost the sensation or motion of the leg to which the opium was applied sooner, or at last in a greater degree, than it did of the other leg.

REMARK.

## R E M A R K.

IT appears from this experiment, that there is no reason to suppose opium will more speedily, or at last more effectually, allay pain or calm convulsions of muscles over which the skin is intire, by applying it to that part of the body which happens to be affected with these, than by applying it to a distant part. And therefore, as opium, when given by the mouth or anus, affects animals sooner than when applied to their skin, it is perhaps better in all such cases to give it inwardly, than to apply it to the sound skin over the affected muscles.

*N. B.* I would only be understood in this place to mean, that the topical influence of opium does not extend so far as has been supposed. but not altogether to deny it; for some practical observations seem to shew it: And we shall afterwards find, that the muscles are soon unhinged  
by

by opium in contact with them; nay, that the heart itself is rendered instantly paralytic, if the opium is applied to its inner surface.

### E X P E R. VI.

I next endeavoured to ascertain the effect of the opium on the muscles when immediately applied to, or in contact with them, and how far the nerves of the skin would suffer by applying the opium to its inner side.

FOR this purpose, I cut a hole in the skin at the top of the thigh, and poured the opium into the cellular membrane between the skin and muscles.

*(Three Trials.)*

I first poured 40 drops of the solution under the skin of the left thigh and leg, having, before hand, broke, with a probe, a partition between these made by the cellular substance of the knee,

I did not attend to the effects till half an hour thereafter, when I found that whole member paralytic, its toes and skin having lost their sensibility, and the muscles their motion. The animal seemed much stupified, and could scarcely move its body from the place by the help of the other hind extremity ; and the blood had ceased from motion in the small vessels of both feet ; tho', on examining the heart, I found it still gave 22 regular, but feeble strokes in the minute. After ten minutes more, all the members of the body were extended and convulsed, and the animal was quite unable to move its body out of the place where it was laid, and soon after died.

*(Two Trials).*

I then tried the same experiment with 20 drops only of the solution ; and observed, that, in about a quarter of an hour, that extremity was much weakened and less sensible, and in five minutes more was not only motionless and insensible, but the animal seemed to be much  
stupified,

stupified, and lay still, unless when it was hurt, and, after nearly the same time as those above, had its members extended and convulsed, and soon expired.

*(Two Trials).*

AFTER that, I tried the same experiment with 10 drops only. After 20 minutes, that leg seemed to be weaker, and, in 10 minutes more, its muscles lost their power, and the toes had little sensibility; and now the animal seemed to be a good deal stupified, and the heart of one of them examined gave only 25 strokes in a minute. An hour and a half after the beginning of the experiment, the toes seemed to have quite lost their sensibility, and the muscles their motion; but the other parts were not convulsed, and the animal jumped by the help of the other hind extremity. And two days thereafter, this leg had recovered both its sense and motion, and the animal seemed quite well, and continued so for 14 days at least.

*(Two*

*(Two Trials).*

IN the last place, I poured 10 drops under the skin of the thigh only in one frog, and the like quantity under the skin of the leg only in another, without finding that either of these members lost their sense or motion, or that the rest of the body was observably affected.

### R E M A R K S.

FROM the above experiments we learn,  
 1. That the nerves of the skin are much more readily, and to a greater degree, affected by the opium applied to the inner side of it, than to the outer side of it thro' the cuticula; not that in this way of applying the opium, the nerves of the skin, by the stretching of the cellular membrane, are tore; for water poured in, in like manner, does not destroy the sensibility of the skin. Nor perhaps can we suppose, that the nerves of the muscles being affected,

fected,

fect, the skin suffers in a great measure by sympathy; since the opium applied to the surface of the skin had little or no effect on the subjacent muscles.

2. FROM the much greater effect opium, in contact with muscles has, than when applied to the sound skin over them, and that it can render them paralytic, without greatly disordering the rest of the body; we learn, perhaps, a method that may sometimes be useful in the treatment of obstinate spasms of particular muscles, to wit, to apply the opium immediately to these muscles.

3. WE see that a member may recover its sense and motion, though these shall have been lost, for a considerable time, by the application of opium.

4. WHEN we compare this with the foregoing experiment, we are at a loss to determine, whether opium, received into the stomach and intestines, lessens the muscular power of those bowels more than of the other organs of the body. For, on the one hand, the villous coat resembles,

in its general structure, the common external teguments of the body, through which opium does not affect the muscles; on the other hand, it is softer, thinner, and has a much more delicate feeling than those have; so that medicines which do not affect the external teguments, not only offend the stomach and intestines, but rouse their muscular coats into efforts to expel them; and opium retards greatly the passage of the fœces. So that, upon the whole, we are led to conclude, that opium, applied to the villous coat of the stomach and intestines, affects their muscular coat more than the distant muscular organs of the body.

5. WE ought generally to avoid prescribing opium in cases of pain and cramp of the stomach or intestines; as these are very often owing to the food putrifying, in consequence of too great debility and relaxation of the muscular coat of the alimentary canal, and then irritating that canal so much as to occasion spasms of its muscular coat. So that,  
though

though opium may remove those spasms for the present; its frequent use, for certain, greatly increases the cause of them, or makes them return with double frequency and violence. But, where we are obliged to give opium in such cases, for instance, to check immoderate vomiting or purging, occasioned by degenerating putrid aliment, and to procure sleep, I imagine it will be generally better to give it in a clyster than by the mouth; since, in the latter way, it singularly debilitates the whole alimentary canal, and prevents it from being able, in the mean time, to expel properly the remains of the putrid ferment.

#### E X P E R. VII.

HAVING observed the effects of the opium on an intire animal, we shall next endeavour to discover how far those effects can be produced by the action of the opium on the nerves to which it is primarily applied, independent of the circulation of the blood, that is, when the circulation

is

is stopped. But here we perceive an obvious difficulty: For, if we stop the circulation in every part of the body by cutting out the heart, or stop it in one particular part, suppose in the hind legs, (where it can be done more easily and certainly than in any other part, by tying the *aorta*, *vena cava*, and lymphatics, at the top of the pelvis;) it is evident that the animal will be dead, or the nerves will have lost their energy in a great measure, if not intirely, (See preliminary facts 3d, 4th,) before the solution of opium can produce its effects in a very observable degree, if it be used in any of the three common methods which have been described, viz. applied to the skin, or given by the mouth, or injected into the anus.

(Two Trials).

ACCORDINGLY, the animal was not observably stupified by applying opium to the skin of the hind legs, after tying the *aorta*, *vena cava*, and lymphatics. And  
therefore,

therefore, to determine this question satisfactorily, it was necessary to discover some other way in which the animal could much more quickly be affected to a violent degree. This I found might be done by pouring 30 drops of the solution thro' a small hole into the cavity of the abdomen \*.

(*Seven Trials*)

FOR, in two minutes thereafter, the heart did not beat above half its usual number of times in a minute. And, after four or five minutes, not above a third part of the usual number; and, on examining the foot with the microscope, I found that the blood in its vessels had entirely ceased from motion. And now the whole muscles were repeatedly convulsed, and the limbs extended, so as to render the animal unable to move out of the place where it lay. After a quarter of an hour,

\* Like to what Drs Langrish and Whytt had observed of *lauro-cerasus* and opium on dogs.

hour, it scarcely discovered any outward sign of life ; though the heart was found to contract feebly about ten times in a minute, five or six hours thereafter.

### E X P E R.    VIII.

HAVING, by the last experiment, discovered a method by which this animal is affected to a violent degree with opium, in a shorter time than that in which the energy of its nerves is considerably impaired by putting a stop to the circulation ; I could now determine, with certainty, whether this animal could be affected in that violent degree through the nerves to which the opium was primarily applied, independent of the absorption and circulation of the blood, by cutting out the ventricle of the heart, and so stopping the circulation, before I poured the solution into the cavity of the abdomen. And, on several trials, I found, that the animal was in this way affected as in the last  
experiment,

experiment, with this only difference, that it required a somewhat longer time to produce these effects in the same degree.

### R E M A R K S.

I. THE much quicker effect of opium poured into the cavity of the abdomen, than poured into the stomach or guts, is not less surprising when we consider it, than it appears at first sight. For, altho' the surface of the sides of the abdomen, and of the abdominal viscera, is much greater than that of the inner side of the stomach or rectum, yet those are covered with a very dense, and, as is said, insensible coat, the *peritoneum*, to which alone the opium, thus applied, is contiguous.

FROM this, we see how unsafe it may be to judge of the effect of a medicine on different organs, merely by comparing their degree of general sensibility, even where the effects can be conveyed through the nerves alone. And, in particular, we may learn, how dangerous it may prove

to take for granted that a medicine, which can be safely admitted into the stomach, may therefore be safely injected into the cavity of the abdomen, as seems to have been done by some of late, who have proposed to cure the *hydrops ascites* by astringent and antiseptic injections made into the cavity of the abdomen, after drawing off the extravasated water by means of the trocar.

2. THESE effects of opium, poured into the cavity of the abdomen, seem to prove the peritoneum to be furnished with nerves, but do not render it altogether certain; since, as my very ingenious colleague Dr Cullen, on my telling him this experiment, supposed, the opium may possibly affect the nerves of the bowels covered by the peritoneum, much in the same way as I have already proved it to affect the *cutis vera* through the cuticula.

3. THE sixth experiment so obviously proves, that opium impairs the moving power of the heart, even when not applied

plied immediately to it, that I should not have again taken notice of this, but that the very learned and ingenious Dr Haller has denied the influence of opium over the heart; being deceived by finding that the heart continued to move, after the animal seemed to be dead in other respects by the action of opium.

4. As the animal was convulsed, and in a short time killed, by pouring the solution into the cavity of the abdomen after cutting out the heart, we have undeniable evidence that there is a possible way of applying opium, so that it may produce those effects through the nerves to which it is primarily applied, independent of its absorption and circulation with the blood; as Dr Whytt, from a similar experiment, first endeavoured to prove\*.

5. THE animal was not quite so soon affected with the opium after cutting off the heart, as when the heart was intire, partly because there was little absorption

\* Essay on the vital motions, p. 375.

of the opium in the former case, and what was absorbed could go no farther than the auricle of the heart; but chiefly and almost intirely owing to this, that the nerves, after the circulation is stopped, much more difficultly receive an impression.

E X P E R. IX.    (*Two Trials*).

I made a ligature around the base of the heart, and cut off its ventricle, and then poured 30 drops of the solution of opium under the skin of the left hind leg and thigh.

EIGHT minutes thereafter, its toes were less sensible, and it began to drag the leg without bending its joints. After a quarter of an hour, its toes were quite insensible, and its muscles only shewed some remains of power when the animal made a violent effort, and, within seven minutes more, they were quite paralytic. After 40 minutes, it lay still unless when hurt. After ten minutes more, it could not act  
with

with the other leg with so much force as to jump, but still could crawl. After an hour, it scarcely withdrew its fore legs from injury.

(One Trial.)

THE opium was poured under the skin of both hind extremities; it could not jump, though much hurt, and, half an hour thereafter, crawled with difficulty out of the place.

(One Trial.)

I tied the *aorta descendens* at the kidneys, then opened it under the ligature, and injected the solution of opium into the crural arteries, which almost instantly rendered the hind legs insensible and motionless. But, after a quarter of an hour, no convulsions were observed in the fore legs or fore part of the body.

(Two

(*Two Trials*).

I cut all the organs at the pelvis, except the large nerves that go to the hind extremities. Then I tacked the hind legs by threads to the trunk of the body, to prevent the nerves from being overstretched or tore; after which I injected 30 drops of the solution of opium under the skin of both hind extremities.

TEN minutes thereafter, the hind legs were less sensible and much weakened, and, in a quarter of an hour more, they were quite insensible and motionless; yet the fore part of the body was not observably affected six hours thereafter, and the animal lived till next day.

#### R E M A R K.

HENCE we see that opium destroys the nervous power of the part to which it is applied, even after the circulation of the blood.

blood has ceased; but that, after this ceases, the nerves of the extremities of the body scarcely bring the distant nerves to suffer by sympathy; or we find, that the concomitant arteries, some how or other, tune the nerves so as to fit them to convey impressiion.

### EXPER. X. (*Two Trials.*)

I laid bare the sciatic nerve for the length of more than a quarter of an inch, and poured on it two drops of the solution of opium; but did not observe that the member was thereby impaired, either in its sense or motion, though I attended to the effects both that day and the two following days.

### REMARK.

HENCE opium acts chiefly, if not entirely, on the tender extremities of the nerves, or seems incapable of penetrating the hard coats they have in their progress:

And

And these coats seem merely calculated for defence against injury, and to possess nothing of the power we peculiarly ascribe to nerves.

### E X P E R. XI.

I destroyed the brain and spinal marrow of two frogs with a wire, and then poured the solution of opium into the heart and aorta of one of them, and into the cavity of the abdomen of the other, without perceiving any convulsions produced in the muscles of the extremities.

### R E M A R K.

THIS experiment gives some additional weight to an opinion I have long entertained, and for several years past endeavoured to establish \*, to wit, that, in general, the nerves of the body sympathize not from their connexion in their progress, but from their connexion at their origin.

### E X P E R.

\* In my course of lectures on anatomy from the 1758, downwards.

EXPER. XII. (*Three Trials.*)

I applied 120 drops of the solution of opium on lint to the skin of the hind legs, for the spaces of half an hour to one frog, an hour to another, and an hour and a half to a third. I then removed the opium, and applied lint wet with 30 drops of *spiritus cornu cervi*; and always observed that the animal, as soon as the spirit touched its skin, expressed signs of very considerable pain; and that the parts were inflamed, and the skin afterwards mortified, in nearly the same manner as where the opium had not been previously applied. Further, as the previous application of the opium did not prevent the spirit acting in the usual manner; so the spirit was so far from preventing the convulsions and deadly symptoms produced by the opium, that it seemed rather to accelerate them.

## R E M A R K S.

1. FROM this experiment there is a presumption, that the previous application of opium will neither prevent the blistering nor mortifying effect of stimulating and caustic medicines, nor the pain they usually occasion.

2. As the skin was mortified by the spirit, and yet convulsions succeeded, we have some reason to suspect, that opium does not merely act on the extremities of the nerves, but penetrates deeper than is supposed, and lodges in the nervous substance for a considerable time before it very remarkably and dangerously affects an animal; and that its operation on the nerves does not instantly cease on removing it, as many have imagined. This inference cannot, however, be drawn with certainty, because we must ascribe a share of the affection to the absorption of the opium by the lymphatics.

I may here mention another experiment which agrees with the foregoing, in seem-

ing

ing to render it not improbable, that the matter of some poisonous substances reaches higher in the nerves than the part to which they are first applied, and lodges in them a considerable time before it produces its full effects. If a probe which has been dipped in strong spirit of hartshorn, be applied to the bared trunk of the sciatic nerve of a frog, it seems, as we would have expected, to give great pain to the animal, and not only almost instantly deprives all the limb, behind this part, of sense and motion; but the animal, in six experiments I made, died two days thereafter, though I put it immediately into water; and tho', several hours after the experiment was made, it exerted the fore part of its body with its former vigour; nay, even in the weak leg, the circulation of the blood continued with great rapidity. Yet, in a great number of other frogs, cutting the sciatic nerves across was so far from killing, that they not only all survived the operations, but, in several of them, the divided parts of the

nerve were very accurately rejoined, without indeed restoring, to the parts behind, their lost sense and motion.

### E X P E R. XIII.

IT remains to examine how far animals are affected by the absorption of opium, and its mixture with their circulated blood.

BUT, previous to this inquiry, I thought it might be of use to know what effect opium has when applied to the heart and vascular system.

#### *(Four Trials.)*

I therefore laid bare the heart, and then injected into a large vein, which runs along the under middle part of the abdomen on the outer side of the peritoneum, a few drops of the solution, viz. 12 drops into that vein of two frogs, and six into that of two others; and observed, that,

as soon as the solution had entered the ventricle of the heart, that organ was rendered incapable of expelling its contents; and, in much less than one minute thereafter, became so intirely paralytic, as not to make the least contraction on the strongest irritation, whether applied to its outer or inner part; whilst, at the same time, the extremities were agitated incessantly with convulsions, which continued for about three quarters of an hour, gradually becoming more and more feeble; nor was the animal able to perform any voluntary motion during this whole period.

*(Two Trials.)*

I next tied a ligature fast around the beginning of the aorta, and, farther from the heart than the ligature, I opened the aorta, and fixed a pipe into it, through which I poured the solution of opium into all the large arteries of the body. In less than a quarter of a minute after this, all the muscles were convulsed so as to  
render

render the joints almost rigid, but not altogether in so great a degree as when that solution was injected into the heart. After half an hour, there were still some subsultory motions observable in the muscles.

### R E M A R K S.

1. WHEN we compare that part of the foregoing experiment which relates to the heart, with some experiments made by Dr Whytt, where the opium was applied to its outer part, we see how greatly the delicacy of feeling of the inner side of the heart exceeds that of its outer side.

2. WE learn that the heart is so far from being exempted from the influence of opium, as the learned Dr Haller supposes, that perhaps no muscle of the body can, by any means, be proved to be so much under its dominion as the heart, when the opium is brought in contact with its inner side; in which way it will be applied, if absorbed.

3. WE

3. WE see how suddenly the whole body sympathizes with the heart.

4. As the arteries were almost empty of blood, and the little they contained was in a stagnating state before the opium was injected into them, and the injection was not pushed with so much force as to penetrate into the small vessels, and yet its effects were similar to those of opium applied to an intire animal; it seems probable that opium, introduced by absorption, would act chiefly, if not almost solely, on the vessels conveying it; and that the rarefaction of the blood, said to attend the use of opium, is not to be considered with Pitcairn, Friend, and with the learned Dr Tralles, as the primary effect of it, but only as a secondary one.

5. OF the different substances composing the sides of the larger arteries, we can suppose the nerves alone capable of suffering by the application of opium, so as to communicate that sufferance by sympathy; and therefore this experiment seems to furnish abundant proof, that the  
large

large arteries are provided with nerves distributed on their inner coat.

#### E X P E R. XIV.

HAVING observed the effects the solution has when poured into the heart, we are now to try, if, in fact, it is absorbed and mixed with the blood, and if it produces observable effects in consequence of this.

THIS is to be known by destroying the nerves of any part in their progress to it, or at their origin; and then observing the effects of opium applied to it. Both these ways were tried as follows.

After cutting, in four frogs, all the nerves which issue from the posterior end of the spine to be distributed to the pelvis and hind extremities, I passed a thread close behind the large blood-vessels, between them and the bones of the loyns, and then tied this thread fast around the skin and muscles of the loyns: Thus cutting or tying the intercostal nerves, which  
alone

alone could be supposed to make any communication of the nerves above with those below, and leaving nothing unhurt but the large blood-vessels, and with them probably the absorbent lymphatic vessels \*. In a fifth frog, I cut all the parts across at the loyns, except the aorta, and cava, with the lymphatics. I then applied about 100 drops of the solution on scraped linen to the skin of the hind extremities of all these frogs ; and, in two of them, I also poured 10 drops of the solution under the skin below the knee. After an hour and a half, the two that had the opium poured under the skin of their legs were violently convulsed, and, in little more than two hours, were dead to outward appearance. But the other two were not  
 affected

\* It will hardly, I imagine, be urged, that any nerves which deserve attention might remain connected to the coats of those vessels, and be propagated from the trunks to the small branches of the arteries, and so to the skin, &c. ; as the arteries in large animals seem to be supplied, as they proceed, from the nearest nerves ; and at any rate such nerves must be very small.

affected to the like degree, till above an hour later.

*(Two Trials.)*

I next cut the spinal marrow across at its middle, and then destroyed, with a red hot wire, the hind half of it; and, 20 hours after this, applied about a hundred drops of the solution, on scraped linen, to both hind legs. After three hours, the animal cried, when the fore part of it was touched. After four hours, it began to be convulsed, and the blood had ceased from motion in the hind feet. After eight hours, it shewed no outward sign of life.

R E M A R K S.

THIS experiment demonstrates, that opium can affect animals universally, in the most violent degree, after all communication of the nerves to which the opium is primarily applied, with the rest of  
the

the nervous system is cut off, by destroying the origin of those nerves, or cutting them through in their progress. Whence it follows, that the opium must have produced these deleterious effects, by being absorbed and conveyed with the blood to organs of the body distant from those to which it was primarily applied, contrary to the prevailing opinion concerning the action of opium, founded on what the most eminent of the late writers have delivered\*, who suppose, that, if it is absorbed, its effects are so inconsiderable, that they may be almost intirely overlooked.

2. THIS experiment shows too, that absorption is carried on with very small assistance from the nerves, as their origin was destroyed 20 hours before the solution of opium was applied.

*Some general Remarks from these Experiments with Opium.*

OP IUM can operate on frogs with such  
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\* Jones, Alston, Van Swieten, Kaaui Boerhaave, and Dr Whytt, as above cited.

violence, as to kill them in either of two ways.

ONE way is, by affecting those nerves to which it is primarily applied, and bringing the rest of the nervous system to sympathize, independent of its absorption and mixture with the blood.

THE other way is, by its being absorbed, and mixed and conveyed with the blood, by which it is brought into immediate contact with the nerves of the heart and vascular system; which it must be supposed to act upon, as it does on those to which it was primarily applied, and to affect other nerves in a similar way by sympathy. Besides which, it may, perhaps, directly operate some change on the mass of blood; though this must be to inconsiderable as scarcely to merit attention.

BUT, as animals are soonest affected with opium whilst they are intire, it seems usually to operate in both the above mentioned ways. And it will appear highly probable, that some not altogether inconsiderable

considerable part of its effects on the human body is owing to its absorption, if we consider, that it requires the space of several hours to operate in its full vigour. And those who reason against its affecting animals to a considerable degree, in consequence of its being absorbed and mixed with their blood, because, on dissection, it did not appear to have passed from the stomach into the intestines, or had lost little of its weight, rest their opinion on the erroneous supposition that the stomach is not provided with lacteal vessels: Or they suppose all the parts of the opium to be equally active; whereas it seems very probable that its active part makes but a small share of its bulk: Or they tell us, they cannot conceive how such a small quantity as the opium had lost of its weight should affect the heart or other organs, after being diluted with the whole mass of blood; though they certainly little better conceive either how it affects the nerves to which it is primarily applied, or the others by sympathy.

*Experiments*

*Experiments with ardent Spirits.*EXPERIMENT I. (*Four Trials*).

ABOUT seventy drops of a mixture of equal parts of white wine and French brandy, which mixture was used in all the following experiments on this subject, were applied on scraped linen, to both the hind extremities of a frog. Seven minutes after this, the animal was observably affected, and its heart beat only 50 times in a minute. After a quarter of an hour, the heart beat only 45 times in a minute; yet the rapidity of the blood in the hind feet was not very observably lessened. After 20 minutes, the heart beat only 40 times in a minute, and the creature was much stupified. After half an hour, the heart beat only 35 times in a minute, and evidently with less force than natural; and now the circulation was considerably less rapid in the vessels of the  
hind

hind feet, and the creature was scarcely able to withdraw its legs when the toes were pinched. After three quarters of an hour, the heart contracted but 30 times in a minute, and the motion of the blood in the vessels of the hind feet was extremely slow, and ceased altogether after 55 minutes; at which time the creature was unable to withdraw its legs from the most severe injury, or when the eye ball was fretted with a probe to shut its eye-lids, which were wide open; and its respiration had intirely ceased.

I now removed the mixture, and washed the legs in water; notwithstanding which, it remained insensible for about an hour and a half longer, although the heart continued the whole time to vibrate, feebly indeed, about 30 times in a minute. But after this, it began to bend the joints of the hind legs spontaneously. And, in 40 minutes more, was able to scramble over the edge of a plate, on which it was laid; yet, till half an hour thereafter, when the heart contracted 40 times in a minute,

minute, the progressive motion of the blood in the feet was not renewed. Thus the animal gradually recovered its sensibility and motion, and the blood its free circulation, till after three hours more, or about the end of the seventh hour from the beginning of the experiment, it could jump with almost its wonted vigour; and the motion of the blood in the feet appeared free and rapid.

WHEN the mixture was applied to one leg only, that leg seemed to be somewhat, but not very considerably, more benumbed than the other; yet the circulation did not cease sooner in the one, than in the other leg.

*(Two Trials.)*

AFTER the mixture had been applied to the hind legs of two other frogs for near an hour, I cut them off and skinned the fore part of the body, and then infused its muscles and the bowels in water, and distinctly perceived the smell and taste of the spirit in the water.

## R E M A R K S.

1. ALTHOUGH, for the most part, a man who is drunk is not quite insensible, nor motionless, nor is his respiration interrupted, nor does his blood, perhaps, cease intirely from circulation in the small vessels; since, notwithstanding the paleness of the skin in some cases, and that I have observed his pulse become very feeble and intermitting, if a vein is struck, a considerable quantity of blood may be drawn from it; yet it is not improbable, that a person, by drinking an excessive quantity of spirits, may reduce himself to a state like to what has been above described in the frog, and notwithstanding recover.

2. WE find that ardent spirits are not so altered by the absorbent vessels of animals, as to lose their taste or smell. And there is some reason to suppose, that the spirits lessened the fluidity of the blood by their mixture with it, whilst they, at the same time,

time, weakened the nervous power of the circulating system.

### EXPER. II. (*One Trial*).

THIRTY drops of the mixture being poured into the cavity of the abdomen, the animal seemed immediately very uneasy, and, after 20 minutes, could hardly remove its body from the place where it lay. But, after six hours, it had greatly recovered, and was able to jump with considerable force.

### R E M A R K S.

1. SINCE frogs are less affected by spirits poured into the cavity of the abdomen, than by the solution of opium, and yet the former irritates the organs of our senses more than the latter, we learn, that opium affects those animals not so much by its irritation, as by its singular and unknown influence.

2. IT

2. It appears, at first sight, very surprising; that spirits applied to the hind legs affect the animals much sooner than the solution of opium applied in the same way; yet, when both are poured into the cavity of the abdomen, the opium produces its full effects sooner than the spirits. To explain the cause of this with certainty is extremely difficult; but one part of the reason may be, that the spirits chiefly operate, by being mixed and conveyed with the blood, without possessing so much the virtue of disordering the whole nervous system by touching one part of it; whereas the opium possesses this last power in a very eminent degree; and therefore, where it is applied to a very large nervous surface, or to the ends of the nerves, but thinly covered with their coats, or with membranes, its effects are very speedy.

### EXPER. III.

As, in the first experiment, the ardent spirits applied to the hind legs rendered

the animal motionless in about half an hour; whereas it can move for about an hour after the circulation is made to cease by cutting out the heart; and, where the circulation is stopped in one member only, it retains a considerable degree of sensation above two hours; it appeared probable, that, if the ardent spirits could disorder the whole body through the nerves to which they were applied, independent of their absorption and mixture with the blood, they would have this effect when applied to the hind legs, after cutting out the heart, or after tying the *aorta*, *vena cava*, and lymphatics.

(*Three Trials.*)

BUT, contrary to expectation, they had not so much effect in either of these ways as to interrupt the respiration, or to disable them from shutting the eye-lids when the eye-ball was touched, or of withdrawing their fore legs from injury; nor did

it

it appear quite certain, that they were at all affected.

*(Two Trials).*

WHEN, indeed, after cutting out the heart, 30 drops of the mixture were poured into the cavity of the abdomen; after half an hour, the animal could not, but with the utmost difficulty, remove its body from the place where it lay.

R E M A R K S.

1. FROM the last way of trying the effect of ardent spirits on the nerves, *viz.* on those of the peritoneum, or sides of the abdomen and abdominal viscera, after cutting out the heart, we see that the whole nervous system can suffer from their touching one part of it; but this sufferance is by no means so evident or considerable, as from the solution of opium applied in like manner. And,

2. As

2. As we find it so difficult to prove from experiments, on the thinly covered, or otherwise more easily affected nerves of the peritoneum, or of the sides of the abdomen and abdominal viscera, that spirits, applied to one part of the nervous system, can affect the whole of it; we need be less surprized that their effects on the nerves of the skin covered by the cuticula, after stopping the circulation, should have been but little observable.

3. WE observe, that, when the blood-vessels are tied, the animal is not affected in its fore part; and hence we can assign no part of the effects of the spirits, observed in our first experiment, to the passage of the spirits through the pores of the parts so as to reach distant organs.

4. THIS experiment agrees with experiment ninth with opium, in proving that the free motion of the blood in the vessels which accompany nerves enables the nerves to convey more readily the effect of medicines to the distant parts of the nervous system, or that the interruption

of the motion of the blood in any member disturbs the free sympathy of other members with it, although the motion of the blood at the supposed origin of all the nerves be no ways disturbed.

EXPER. IV. (*From five Trials*).

To show how far the animal could be affected from the absorption of the ardent spirits and their mixture with the blood, the nerves of the hind legs were cut in some, and the hind half of the spinal marrow was destroyed in others, as mentioned in the experiments with opium; and, immediately after this, as likewise two, three, or even ten days thereafter, the mixture was applied to the hind legs, and it was constantly found to produce all the same effects in the same degree, almost as soon as when it was applied to a sound animal; and, on removing the mixture, and washing the legs, the animal recovered in the same time.

## R E M A R K S.

1. THIS experiment proves, that ardent spirits can exert their full energy, independent of those nerves to which they are primarily applied, that is, by their absorption and mixture with the blood.

2. AND the animal being in this experiment affected to the same degree in nearly the same time, it follows, that they naturally operate, at least when applied to the skin, chiefly by their absorption and mixture with the blood.

3. WE have here another proof of the continuance of absorption, after the nervous influence cannot be made manifest by any experiment.

*Experiments with essential Oils, instanced with Camphire.*

EXPER. I. (*One Trial*).

CAMPHIRE in fine powder being applied to one foot, in about seven minutes,  
the

the vessels of that foot appeared turgid and red, and the blood in them had intirely ceased from motion ; yet the circulation was still free and rapid in the other foot.

I next applied the camphire to that whole leg as high as the knee, which, in about half an hour, observably stupified the animal. I then removed it, and washed the leg, and next day the animal seemed pretty well recovered.

*(Two Trials).*

AFTER this I applied the camphire to both hind extremities ; in a quarter of an hour, the creature was considerably stupified ; after half an hour it was almost insensible of injury, and did not withdraw its fore legs, unless its toes were severely hurt ; and the heart only contracted about 40 times in a minute, quite regularly ; but then its ventricle was greatly more distended, before it contracted, than natural,

tural, or than it was in any foregoing experiment; at the same time, it seemed to expell all its blood at each contraction. In about an hour and a half, the animal discovered no other mark of sensibility or outward appearance of life, than an irregular and scarce perceivable trembling of some muscles when the toes were bruised; and now the heart contracted little more than 30 times in a minute. And, although the camphire was removed, it did not recover.

*(Two Trials).*

I applied the camphire in like manner to two frogs for an hour and a half, and then I cut off the hind legs and the whole of the skin; and, on opening the abdomen, I distinctly perceived the smell of the camphire in it, and, after infusing the bowels in spirits and in water, I plainly perceived its taste in those liquors.

(*One Trial*).

CAMPHIRE dissolved in oil, and applied to the hind legs, had the same effects.

EXPER. II. (*One Trial*.)

THIRTY drops of a strong *emulsiō camphorata* were poured into the stomach. After ten minutes, the animal was observably weaker and stupified; and its heart beat only 50 times in a minute, and the ventricle before each contraction was more distended than it is naturally. After half an hour, it scarcely could jump. After an hour, the circulation was become extremely slow in the hind feet. After two hours and a half, the heart contracted only 40 times in a minute; and the animal was not able to crawl from the place where it was laid. After three hours, the heart beat but 36 times in a minute; and, when the toes were hurt, it could not withdraw them from the injury; there

was only a faint trembling of some of the muscles.

NEXT morning, about twelve hours from the beginning of the experiment, it was found dead and stiff.

### R E M A R K S.

I. THE turgescency and redness of the vessels to which the camphire was applied, seem to show that it irritates and heats the part with which it is in contact; contrary to a notion that prevails with many. The stoppage, of the blood observed to happen much sooner in that foot to which the camphire was applied than in the other foot, I suppose to be more owing to its effluvia, entering the pores of the membrane between the toes and coagulating the blood, than to its action on the solids; especially that the blood lost its motion, in like manner, on applying camphire several days after the nerves had been cut.

2. WE

2. WE observe, that, in an over dose, whether applied outwardly or inwardly, it acts as a narcotic; which especially appears from the extraordinary dilatation of the ventricle of the heart before it contracts.

### EXPER. III. (*One Trial.*)

I tied the *aorta*, *vena cava*, and lymphatics, and then applied camphire to the hind extremities; but without finding, after three hours, that the animal was in the least degree affected.

### (*Two Trials.*)

AFTER destroying the brain and spinal marrow with a probe, I cut out the heart, and then applied camphire to the hind legs. After an hour and an half, I examined the fore part of the body, without perceiving the smell or taste of the camphire in it.

## R E M A R K S.

1. WE have before seen, in similar experiments with the ardent spirits, that it is unsafe to conclude, from this experiment, that camphire cannot stupify an animal through the nerves to which it is primarily applied, because the nerves have their energy very much impaired on stopping the circulation.

AND although I found, by another experiment, that camphire, put into the cavity of the abdomen, killed an animal in a short time; yet I neglected to try its effects in the cavity of the abdomen, after cutting out the heart: But I suppose, from the analogy of the eighth experiment with opium, that, in that way of making the experiment, they would have been very observable.

2. THIS experiment proves further, what was remarked of the ardent spirit, viz. that its influence on distant parts of the body, from its passage through pores, inde-

independent of vessels, is so inconsiderable as altogether to escape observation.

#### E X P E R. IV.

I cut all the crural nerves in one frog, and destroyed the hind half of the spinal marrow in two others, and then applied camphire to the hind legs of all; and found it to produce the same effects, in nearly the same time, as when applied to a sound animal.

#### R E M A R K.

THESE effects, from the application of the camphire, reason teaches us, can solely be accounted for from its absorption and mixture with the blood. But, to prove this absorption in fact,

*(Two Trials.)*

I divided two frogs at the pelvis, two hours after the camphire had been applied

to

to them in the above way; I then pulled the skin off the fore part of their body; and found, that the flesh and bowels had a smell of the camphire. To discover this more certainly, I cut them in pieces, and poured on one rectified spirit of wine, and on the other water; and was sensible of the taste of the camphire, both in the spirit of wine, and in the water.

*General Corollaries, collected from the Remarks made on the foregoing Experiments with Opium, ardent Spirits, and essential Oils.*

1. IT is obvious that the effects of those medicines on frogs, for example of the opium and ardent spirits, in an over dose, are analogous to their effects on men and quadrupeds.

2. THEY affect an animal in a similar way, whether applied to an outward or inward part of its body.

3. THE

3. THE effects of the same quantity of those medicines are more speedy when poured into the *primæ viæ*, than when applied to the sound skin, agreeable to the common doctrine. Yet,

4. THE reason given for it, viz. that the *primæ viæ* are more succulent and sensible, is extremely fallacious; for, although the great guts can, without disorder, bear some things which are very offensive to the stomach; yet opium and probably many other medicines, affect frogs by the anus, sooner and perhaps more than by the mouth. And an injection into the cavity of the abdomen, or, to speak more accurately, into the cavity of the peritoneum, which is very dense, and is said to be insensible of cutting, laceration, and erosion, affects an animal much more quickly, and with greater violence, than when poured into the *primæ viæ*.

HENCE the effects of medicines are not in all cases proportioned to the general degree of sensibility of the organs to which they are applied, nor to their laxity or num-

ber

ber of vessels, nor, perhaps, can any universal rule be formed ; each organ seeming to be endowed with its peculiar sense.

5. All the above named medicines can affect animals in two ways : And all can affect them in either way to such a degree, as to render them insensible and motionless ; or, if long enough applied, to kill them.

ONE way, is by acting on these nerves to which they are primarily applied, so as to bring all the other nerves to sympathize, independent of their mixture with the blood.

THE other way, is by their being absorbed, mixed, and conveyed with the blood, independent of any influence on the nerves of the part to which they are primarily applied.

6. But, as animals are soonest, and to the greatest degree, affected by those medicines, whilst the absorbent, the circulating and the nervous systems all duly exercise their functions ; it follows  
thence

thence, and it is also reasonable to suppose, that on a sound animal they operate in both these ways.

7. To determine the degree in which these medicines act on a sound animal in either of these ways, or even to which of them we are to ascribe the greatest effect, is difficult; because, we must suppose, that by impairing the nervous influence, the absorption is diminished in most instances, or perhaps increased in some instances, where the medicine is very irritating; and we have found, for certain, that the nerves of the extremities can scarcely propagate the most violent impression to the other nerves, if the circulation in that part is stopped: And, therefore, we must suppose, that, when the nerves of the abdomen are impressed by a medicine, after cutting out of the heart, the sympathy of the other nerves with them is less remarkable than it would be, were the animal entire. So that we cannot, in that way, have a perfect idea of the effect of a medicine upon the nerves alone; and, although we knew the exact

effect on one part, we could not, *a priori*, determine what it would be on another part.

8. We may indeed presume, that the effects of all the forementioned medicines, when they are applied to the found outer surface of the body, are chiefly owing to their absorption, mixture, and conveyance with the blood, since they operate as violently, and nearly as soon, when the nerves of the part to which they are applied are cut, as when they are entire.

If, again, they are applied to the more sensible inward surface of the *primae viae*, they may probably operate more speedily, and, in some cases, more violently, through the nerves alone, than by their being absorbed and conveyed with the blood.

AND whether a medicine is applied inwardly or outwardly, the quantity of it, or of its vehicle, or the nature of the part to which it is applied, will probably alter the proportional effect, in the one or in the other way.

9. THE sympathy of the nerves depends chiefly, and almost entirely, on their connection at their origin. At the same time, it has appeared, that, in some places, neighbouring nerves more readily sympathize than distant ones.

10. As the opium has a surprising influence over the heart and arterious system, when directly applied to them; and these effects, though greater, are similar to the effects of this medicine when absorbed: We may infer, that, when it is absorbed, mixed, and conveyed with the blood, its effects are almost solely to be ascribed to its operation on the nerves of the heart, and vessels through which it is carried. And, by analogy, the like is probable of many other medicines.

11. I am far from denying in the last corollary, that these medicines produce any alteration on the texture of the fluids; on the contrary, I am persuaded they do alter them, and that, by long continued use, those alterations may be so considerable, as to affect the animal œconomy, though,

though, perhaps, we may not be able to perceive or ascertain their nature by our imperfect senses: I only alledge, that the effects operated on the fluids by one dose, or by one over-dose, are inconsiderable, when compared with its effects on the nerves of the circulating system.

12. WE are to consider, that the nerves of the heart, and large branches of the vascular system, affected by medicines absorbed and conveyed with the blood, will influence, by sympathy, other nerves of the body, to which these medicines may not perhaps be able to penetrate through the very small vessels.

13. MEDICINES circulated with the blood, will probably affect some organs more readily than others, owing to the very different termination of their vessels, and various feeling of their nerves. Hence, we may suppose, there are, in nature, medicines which, with strict propriety, might be termed *cephalic*, *pulmonic*, *hepatic*, *splenic*, &c. though hitherto these names have been applied with so little precision,

precision, that at present they are justly in difuse with many phyficians.

NAY, in fact, we may obferve, that the matter of difeafe, or acrid medicines, mixed with the blood, more readily and frequently affect the fkin, trachea, and kidneys, by means of which chiefly fuch particles are fecreted from the blood, and excreted, as by the functions of life have been rendered irritating and hurtful to the conftitution, than the other glands or parts of the body.

ART.

## ART. XIV.

*Of the use of the Bark in Dysenteries, and a Hoarseness after the Measles, by the late ROBERT WHYTT, M. D. F. R. S. and Fellow of the Royal College of Physicians in Edinburgh\*.*

THE virtues of the bark in curing intermitting fevers have been known ever since it was first introduced into medicine. Afterwards, it was likewise given with success in fevers of the remitting kind †. Its use as a bitter and strengthener in nervous, hypochondriac, and hysteric complaints, is of a much later date. About the year 1731, its power to stop mortifications was first made

\* Read January 1761.

† Mortoni opera.

made known<sup>\*</sup>; and not long after, it was justly recommended to promote supuration in the less favourable kind of the small pox †. Its good effects in putrid and malignant fevers ‡, and sore throats, and in resolving indolent swellings of the scrophulous kind ||, have been but lately published. Nor is it to be doubted, that future experience will shew the use of this valuable medicine in several other diseases.

AT present, I shall confine myself to the good effects that I have observed of it in dysenteries, and in that hoarseness which is sometimes a consequence of the measles.

As a dysentery, especially one of the worst kind, is accompanied with a putrid disposition of the humours, and a malignant fever; as by the continuance of  
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\* Philosoph. tranfact. No. 426.

† Edinb. Med. Essays, vol 4. p. 1. art. 10.

‡ Pringle on the diseases of the army, part. 3. chap. 7. and Huxham on fevers, chap. 4. and 8.

|| London Medical Inquiries and observations, vol. 1. No. 18. and 26.

the disease, the mouth, tongue, fauces, and alimentary canal are often affected with a bad sort of aphthae; and, as a hiccup may come on, and the patient die, although the purging has been considerably less for several days, I imagined that the bark might, in such cases, be used with advantage; and, upon trial, I had the satisfaction to find, that I had not been mistaken in my conjecture.

AFTER bleeding once, or oftener, as the circumstances of the patient may require, vomiting once and again with ipecacuanha, and giving several doses of rhubarb, either alone, or with equal parts of the *confectio japonica* of the Edinburgh dispensatory, and some drops of laudanum, I ordered the following decoction:

℞ *Cort. peruvian. pulverat. ʒi. Coque ex aqua fontanae lib. iv. ad lib. i. Subsidat paululum. dein effundatur decoctum. Cui adde confect. japon. ad ʒii. vel ʒss.*

OF this the patient takes two table spoonfuls six times, or three spoonfuls  
four

four times in the twenty-four hours. It generally agrees with the stomach, and commonly, in a few days, lessens the purging. While he uses this medicine, I give him no other but some laudanum at bed-time, to procure rest. If he becomes costive, which sometimes happens after taking the decoction six or seven days, I leave out part of the *confectio japonica*, and give some rhubarb to open the body.

The bark, given in this manner, will either prevent, or, at least, mitigate that apthous inflammation, which frequently comes on towards the end of a dysentery, and carries off the patient: Nay, after the apthae have actually appeared, the bark will often make a cure: Of which I have had various instances; but shall only mention the two following, as being the most remarkable.

1. A gentleman, aged sixty, who had almost all his life enjoyed good health, was, in the beginning of November 1759, seized with violent gripes, and, next day,

began to purge blood. This purging and gripes increased, and were attended with a quick pulse, a total loss of appetite, and a great sickness at the stomach.

HE was twice blooded, took three vomits of ipecacuanha, a dose of rhubarb, with *confectio japonica*, once in two nights; and a mixture of mint-water and japonic confection by spoonfulls, four times a day. He had likewise taken, after the third day, from twenty to thirty drops of laudanum every night, at bed-time; and, when the gripes were most violent, warm fomentations had been applied to his belly.

ALTHOUGH, by these remedies, the purging was, in a fortnight, sensibly abated, yet the want of appetite, or rather an utter aversion to all food, continued; and, to the other symptoms, was added a great faintness, with a quick and low pulse. As his tongue began now to grow whiter than it had been at first, I suspected an aphthous crust to be fast coming on; and therefore ordered the de-  
coction

coction of the bark, with the *confectio japonica*, as above. This he had scarcely used a week, when his purging was so much abated, that he had not above two motions in a day. About this time, also, the apthous crust on his tongue began to come off, leaving the parts very red and tender under it. The sickness at stomach was lessened; but he still complained of want of appetite; and his pulse continued quick. However, by the use of the decoction for two weeks longer, his tongue recovered its moisture, and nearly its natural colour; his appetite mended; he gained strength; and his pulse, which had long kept at about 100 strokes in a minute, came down to near eighty.

FINDING him growing costive, after taking the medicine for a week, I first reduced the quantity of the *confectio japonica* to two drams, and at last kept it out altogether, adding a little cinnamon instead of it.

2. A lady, above seventy, was seized with a dysentery, December 1759. for which

which she was twice blooded, took one or two vomits, and some doses of rhubarb; and had anodynes either in clysters or in draughts, at bed time. After she had been ill a week, I was called; and then she complained of severe gripes; but her stools were not so bloody as before: her mouth was constantly dry; and her tongue was of a deep red colour; but her pulse was pretty natural.

By taking, for a few days, some boluses of rhubarb and *confectio japonica*, using fomentations to her belly, and the anodyne draughts or clysters at bed-time, not only the discharge of blood, but the gripes and frequency of the stools, abated. Her tongue, however, looked worse; and the back part of the palate with the uvula became covered with a thick white apthous crust. Her pulse also, about this time, began to be unequal, and frequently to intermit. She complained of a burning heat about her stomach; and her gullet was often affected with spasms, which occasioned great difficulty in swallowing,

lowing, and sometimes awaked her with a sense of suffocation. Under these circumstances, I prescribed her the same decoction of the bark, with the *confectio japonica*; of which she took, at first, about an ounce and a half four times a day: But, observing the apthous crust to increase, and not only to cover her tongue, but also to spread on the inside of her lips and cheeks, and that the difficulty of swallowing and spasms in her gullet continued, I ordered the same quantity to be taken six times in the twenty-four hours. After using it for ten or twelve days, the apthae on the lips, cheeks, and other parts, began to fall off; and, in less than three weeks, they were quite gone, as well as the difficulty in swallowing, and burning heat in the stomach. From this time, she gradually recovered her strength; and she is now in perfect health.

DURING the last fifteen days of using the decoction, she was generally costive; on which account I lessened the quantity of the *confectio japonica*, and ordered,

once

once in two or three days, a laxative clyster or a scruple of rhubarb.

It cannot be justly alledged, that these cures were owing solely, or even chiefly, to the *confectio japonica*; since the first of these patients, before he began to take the bark, used the confection freely in mixtures and boluses, without any other effect, than restraining, a little, the violence of the gripes and purging. Besides, in dysenteries of a bad kind, I have never found such good effects from the confection alone, as I have experienced from it when given with the bark. It is necessary, at least at first, to join the japonic confection with the bark to make it sit easier on the stomach and to prevent its running too quickly through the intestines. In the cure of dysenteries, the confection acts chiefly as a palliative, while the bark strikes at the root of the disease.

I have given the decoction of the bark with the japonic confection successfully to several, in dysenteries of a less malignant

nant kind, and without any aphthae; and I always observed, that it not only soon abated the purging, but sensibly strengthened the patients. However, it will be proper to add, that I have never prescribed it, till after bleeding, vomiting, and giving several doses of rhubarb.

In dysenteries of the worst kind, after the hiccup comes on, (which I take to be a sign of a mortification beginning in the stomach or bowels), I have found no benefit from the bark; which is agreeable to an observation of my ingenious friend Mr Cleghorn of Dublin, who sometimes gave the bark, in Minorca, with a view to prevent the mortification of the intestines in the last stage of the distemper\*.

*Of the use of the Bark in a Hoarseness after the Measles.*

WHEN a hoarseness after the measles is attended with a quick pulse, and a  
difficulty

\* Observations on the diseases of Minorca, p. 237.

difficulty in breathing, bleeding, blisters, and vomits, with cooling pectoral medicines, proper diet and exercise, are the principal remedies; and there the bark is not to be used at all, or with caution. But, when a hoarseness succeeds the measles, and is neither accompanied with a quick pulse, nor dyspnoea, I have observed a decoction of the bark to be most successful; as will appear from the following cases:

I. R. B. aged about twenty-one, after the measles had disappeared, was troubled with a great hoarseness, a cough, and viscid phlegm. The *uvula* and *velum palatinum* appeared slightly inflamed; his pulse was soft, and did not beat above seventy times in a minute.

FOR these complaints, December 12. 1757, I ordered him to drink, six times a day, a gill of lintseed-tea, sweetened and acidulated with syrup of vinegar; to breath frequently over the steam of hot water and vinegar, and to rub the following

lowing liniment, thrice a day, on the outside of his throat.

℞ *Ol. camphorae.* ʒi. *Sp. sal. ammon. cum calce viva praep.* ʒii. *M.*

December 14. HE took, at bed-time, half a dram of rhubarb, which purged him five times next day; but the hoarseness and cough continued the same, though his pulse was come down to sixty in a minute.

———— 16. A blister was applied to his throat from ear to ear.

———— 18. THE cough was not so hard; but the hoarseness continued as ever. I therefore ordered two ounces of the following decoction four times a day.

℞ *Pulv. cort. peruvian.* ʒi. *Coque ex aqua fontan. lib. vi. ad lib. i. Subsidat paululum, dein effundatur decoctum; cui adde aceti vin. alb. ʒvi. Sacchar. alb. ʒiʒ.*  
*M.*

By the use of this medicine, in two days, both the hoarseness and cough were sensibly better; and, on the 29th of December, the patient was perfectly well.

2. A boy of twelve years old, after the measles had gone off, complained of a cough, hoarseness, pain about the larynx, and a diarrhoea, with a full and quick pulse. On the 9th of March, he was blooded, had a blister applied to his throat, afterwards took a dose of rhubarb, and drank an infusion of lintseed. On the 11th, the cough and hoarseness continued, with some difficulty in swallowing; four ounces of blood were taken away. Neither this nor the first was sisy. On the 18th, all his complaints being removed, except the hoarseness, which was not in the least abated, I ordered him two ounces, thrice a day, of the above mentioned decoction of the bark with vinegar, by which the hoarseness was almost quite cured in three days.

3. ANOTHER boy of eleven, who, soon after the measles had disappeared, became so hoarse, that he could scarcely be heard, was perfectly cured by the same remedy in two or three days.

As this patient had no degree of fever, cough, nor other complaint besides the  
hoarse-

hoarseness, without bleeding or blistering, I ordered the decoction of the bark with vinegar, which I had found answer so well on former occasions.

I added the vinegar at first, to prevent any bad effects from the supposed astringent quality of the bark; and finding the medicine succeed, I made no alteration afterwards, though it is probable that the cures were owing to the bark alone; since, in the first of these cases of the hoarseness, the vinegar had no effect without that medicine.



A R T.

## ART. XV.

*A particular Method of giving the Solution of Corrosive Sublimate Mercury in small Doses, as an Anthelmintic, by JOHN GARDINER, M. D. and Fellow of the Royal College of Physicians in Edinburgh\*.*

SOME years ago, when the solution of the corrosive sublimate mercury in malt spirits came to be in general use, for the cure of the venereal disease, conceiving a good opinion of it, from the deserved high character of the Baron Van Swieten, who recommended it to the public, I tried it with many of my patients, and with remarkable success in most cases that were not of long standing; but, where the disease had acquired any

\* Read 1764.

any considerable degree of virulence, it frequently proved inferior, in its salutary effects, to some other of the more simple preparations of mercury in common use: Besides, there often occurred instances, where, on account of a delicacy of the stomach and bowels, it could not be continued a sufficient time. Notwithstanding, as it is not so apt to run off by the salival glands, when given in moderate doses, as most of the other preparations of mercury are, and is of course better suited to be given in slight cases, and when the patient cannot conveniently be confined, it ought to be considered as a valuable medicine.

SOME material objections with me to this method of giving the corrosive sublimate were, its abominably brassy taste; and, by its immediate action on the stomach from its liquid form, if given in any quantity, it frequently occasioned a considerable nausea, pains in the stomach, and vomiting; and these patients, in a little time, commonly come to have

an unconquerable aversion to it. Being desirous therefore of obviating these objections it became necessary to alter the formula, which was done by dissolving fifteen grains of corrosive sublimate in six drachams of common water, first acidulated by a few drops of spirit of sea-salt, in order to saturate any earth that might be in it, and so prevent the corrosive mercury from being decomposed. In two or three days, a clear solution was obtained; to which I added as much crumbs of bread as was sufficient to make it into a mass of pills, which was done in a glass mortar, the only sort to be used for this purpose; then the whole was divided into 120 pills, each containing  $\frac{1}{8}$  of a grain. As an antivenereal, I used to give 3, 4, 5, or even 6 pills twice a day, according to the nature of the symptoms, the constitution of the patient, or my intentions in the method of cure.

THESE, from experience, answer every purpose of the solution as an antiscorbutic,

butic, or antivenereal, and with the additional property of their being a powerful anthelmintic. I have of late, notwithstanding this, changed my method of making the solution, with equal success as to its virtues, for that used in the Royal Infirmary, with this difference, that, although it is in my power to dissolve above a drachm of corrosive sublimate in half an ounce of the saturate solution of crude *sal ammoniac.*; yet I only dissolve half a drachm of the sublimate in that quantity of the solution, which, when made into a paste in a glass-mortar, as above, and divided into 240 pills, reduces them to less than half the size of what they were in my first prescription; and they appear to have the advantage of the liquid solution in the following particulars: That, when a little dried, by their being kept a day or two, they occasioned no bad taste; they do not act so immediately on the stomach as in the liquid form; at the same time, they are of easy solution; and the

dose

dose can be ascertained to the greatest exactness.

THE efficacy of this medicine in destroying worms, was first discovered to me by one of my venereal patients, a student in physic, who had been taking these pills ten or twelve days, for the cure of two or three slight venereal sores or shankers. Upon his recovery, he told me, that he was not only cured of his venereal disease, but of another very troublesome disorder with which he had been plagued upwards of 13 or 14 years, the *ascarides*, and the *vermes cucurbitini*; for which he had taken, during that time, immense quantities of tin-powder, mercurial purges, &c. to very little purpose. He had passed, at different times, a large number of the *vermes cucurbitini*, under their usual form, linked together, and measuring some feet in length, all of them dead, as were vast numbers of the *ascarides*, which he voided at the same time.

THIS person mentioned, from experiment on himself, what has since been

confirmed to me by repeated trials, that though the liquid solution of corrosive sublimate may prove a poison to worms in the stomach, yet it is ineffectual in the cure of worms in the bowels; which probably must be accounted for from its being carried off chiefly by the absorbent vessels in the stomach: Whereas, in the above form of pills, they get into the bowels before their solution is much advanced.

NOT long after this, I gave these pills to a maid servant of one Mrs M'Gie, about thirty-six years of age; she had been afflicted with worms many years, and was thereby rendered valetudinary, complaining of pains in her stomach and bowels, costiveness, want of appetite, and sometimes of want of rest. She took two pills twice a day, upwards of three weeks, taking a purging medicine every seventh or eighth day. In the first fortnight of her taking these pills, she passed a considerable number of the *vermes cucurbitini*, and great quantities of the ascarides; but, during the last ten

days of her using this medicine, no worms of any sort being observed in her stools, she left off the pills, and began a course of bark, salt of steel, and bitter infusions; which medicines were continued for some time, and with success; this patient having informed me, about eighteen months after, that she had not been troubled with the smallest appearance of worms from the time she had been under my care for that disorder.

To avoid the tiresome detail of a number of cases, I shall only add one other instance of the good effects of this medicine in destroying worms.

A married lady, about thirty years of age, of a very delicate constitution, and who had been subject to worms from her infancy, was, at the time I was called to visit her, much distressed with the ascarides; and was confined to her bed from some threatenings of a miscarriage. She had, besides the prescriptions of physicians, taken, at different times in her life, a variety of nostrums against worms; but without receiving much benefit from them.

them. She took two of the above pills morning and evening; and, in a few days, began to pass great numbers of the *ascarides*, and also a good many of the *vermes cucurbitini*; and which she continued to void in greater or lesser quantities for the best part of a week. After this patient had taken these pills about ten days, she left them off, took a dose or two of sacred elixir, then returned to the pills again for ten or twelve days more, which intirely freed her from every appearance of worms for about half a year.

It is necessary here to observe, that, although the patient may be freed from worms by the above, or any other method, yet, if such a weakness in the digestive powers should remain, as, together with an unusual quantity of phlegm in the stomach and bowels, would favour the hatching of their eggs, such a person must continue to be subject to this disorder. As was the case with my last mentioned patient, who has been obliged several times within these four years to  
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have recourse to her former medicines, always indeed with the same success of freeing her from the worms; but she has constantly refused to take the proper medicines for strengthening of her stomach and bowels, and for lessening the quantity of phlegm in these parts; a practice which ought to be held indispensably necessary after every course of anthelmintic medicines.

NOTWITHSTANDING my success with the above patients, and with several others who have been under my care at different times during these four or five years past, for the cure of worms, wherein these pills were the only anthelmintic remedy used; I should be very sorry to be understood as recommending a medicine which will answer at all times in such cases; being my self an unbeliever as to infallible remedies: All I will venture to say for the above pills is, that, where the use of them is not forbid by a fever, or some other disease in which mercury is improper to be given,

ven, they will frequently succeed in the cure of worms, when other medicines have failed.

MERCURY, and its preparations, have been for many ages recommended as anthelmintics: But the particular preparations given for this purpose have been either too violent in their effects to be continued for any time, which is necessary to be done, before you can be certain of freeing your patient from the whole breed with their eggs; or, perhaps, quite effete, and consequently of no use. As, for example, calomel is seldom given as an anthelmintic, unless with cathartics, it is of quick operation, frees the intestines from a good deal of slime, in which the eggs are hatched, and very often carries off some of the old ones; but it is too draughtic in its operation to be frequently repeated: And as for *Æthiops mineral*, when properly made, that is to say, when the mercury and sulphur are, by long triture, intimately conjoined, it has very little, if any effect: Whereas,

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the corrosive sublimate, by moderating its dose, and giving it in the above form of pills, may be rendered as mild as any mercurial medicine I know; and, by giving it regularly every day, worms in the stomach and bowels can scarcely escape its effects for any time.

I have tried this medicine with children, in small doses: And, though sometimes with benefit, yet not always with the same success as with those of a more advanced age, where a proper dose could be given. For, unless one fourth of a grain can be taken twice a day, I do not think it proves an effectual poison to worms; which quantity may safely be given after eleven or twelve years of age.

*Remarks*

*Remarks on Dr GARDINER'S Paper on the  
use of Corrosive Sublimate, as an Anthel-  
mintic, by Dr CLERK.*

SINCE Dr Gardiner's paper was deli-  
vered to me, I have had only two  
cases of worms that I could try his me-  
dicine in. One of them was that of a  
boy of about thirteen years of age, a pa-  
tient in the royal infirmary, and who  
was subject to the common round worm.  
He was cured, by the use of the strong so-  
lution of corrosive sublimate made up in-  
to pills with bread, in a week or two.

THE other case was that of a young  
gentleman, aged sixteen, who had been  
afflicted with the *vermes cucurbitini* for  
three years and a half. For the first year  
and a half of that time, besides the pas-  
sing of worms, he had no other com-  
plaints but a grinding of his teeth, and

a *pruritus ani*. He passed generally about twenty worms by stool every day, always living; and sometimes they crept out into his breeches, especially after walking much. After the first year and a half, besides the above symptoms, he had likewise a giddiness, general weakness, and palpitations, with timorousness, and an intermitting pulse, (especially in the morning). He had used many different vermifuge medicines, without any success; such as the *pulvis stanni, limatura martis*, mercurial purgatives, lime-water, (which, upon first using it, purged him), juice of tansy, and the *pulv. vermifugus* of the Edinburgh dispensatory. After which, he tried the corrosive sublimate after Dr Gardiner's method, taking at first one pill evening and morning, and afterwards two at the same times, and continued them for three weeks. After the first four days, he took a dose of *pilulae cocciae*; and at the end of all, a second. During this course he passed great numbers of the *vermes cucurbitini*;

*bitini*; but what came away after the first four days were all dead. He passed none after the twelfth day of using the medicines; and, in a few days, got rid of all the symptoms of worms, except that he had not recovered his strength. He continued well for about a fortnight; but, after that time, the palpitations, intermitting pulse, timorousness, and languor returned; and, in some weeks more he began to pass pieces of a dead tape-worm, about three inches long, along with a white matter or phlegm. After that, the living cucurbitini appeared, and came away sometimes without his knowledge, as formerly; and were attended with the *pruritus ani*. I have lately begun him with a second course of the corrosive sublimate pills and purgatives; and cannot as yet say what will be the effects of it; but, if it shall free him from the worms a second time, I intend to give him after it a course of the bark and steel, with a view to strengthen his bowels, and prevent a relapse.

I have likewise seen a letter from Mr Small a gentleman who lives in the Highlands, and who has been in use, for some time past, to give the corrosive sublimate pills, by Dr Gardiner's directions, to many patients labouring under the flux, and likewise to others affected with worms. He says, that he has had remarkable success with them in both these diseases.

UPON the whole, I think there is reason to believe, that this method of giving the corrosive sublimate will be of considerable use in obstinate cases of worms; and likewise, that it is a convenient method of giving mercury in several other diseases.

DAV. CLERK.

Nov. 15. 1764.

ART.

## ART. XVI.

*On the Abuse of Caustics in venereal warty  
Excreescences, by JOHN GARDINER, M. D.  
Fellow of the Royal College of Physicians,  
Edinburgh.*

SOME years since, being consulted for a young gentleman, who had been ill of a venereal disorder upwards of nine months, there appeared, upon examination, a phymosis, which, by the patient's account, came on soon after the infection, and continued till that time. Round the edge of the prepuce were a number of small warts; and, from some hard knotty swellings, to be felt covering the whole of the glans, together with a discharge of a putrid ichorous matter, I suspected it and the prepuce to be much ulcerated and warty. Having therefore advised  
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the cutting off the foreskin, previous to every application or course of medicine, Mr Alexander Wood (now one of the surgeons to the Royal Infirmary) was employed for this operation.

HE cut off the whole of the prepuce, which was scirrhus, full of shankers and warts, when the glans appeared covered over with fungous excrescences, which gave it much the appearance of a small collyflower; so far as it was possible, the scalpel and scissars were also employed for their extirpation; but they were so numerous, had in general such broad bases, and were so deeply rooted, it was impossible to do much more in this way than to take off their tops. What remained, therefore, was left to be taken off by caustic; and accordingly, the red precipitate was used for some days with success; but afterwards it did not appear that they decreased in the least; on the contrary, they seemed to grow larger, and with the additional vexatious circumstance of their becoming hard and horny.

ny. Then the lunar caustic was tried, but with no better success; and the excrescences, at last, became so extremely hard, that the most concentrated oil of vitriol, spirit of nitre, Belhoste's liquid caustic, butter of antimony, or any other the most violent caustic I could suggest, had not the smallest effect towards diminishing their size. They did indeed burn the surface where-ever they were applied, and rendered it as hard as a piece of board; but, upon shaving off this incrustation with a sharp scalpel, they did not appear to be in the smallest degree less than they were before the application of the caustic.

HAVING gone on in this way for some considerable time, touching with the caustic every day, shaving off the hardened surface next morning, and again applying the caustic, but without any the least prospect of success; it became to be a very difficult matter to determine on what farther might be proper to be done in this case.

IT being reasonable to suppose, from the quantity of mercury the patient had taken, that every venereal taint in his blood and juices was sufficiently corrected, and that the excrescences upon the glans had become merely a topical disease, his mercurial medicines had been left off for some time. Fomentations had hitherto been used three or four times a day, and an emollient poultice kept constantly applied, in order, if possible, to keep the parts soft; but the hardness brought on by the use of the caustics, being insuperable while they were continued, I determined to leave them off, and to apply emollients only, until the hardness should be wholly overcome: Accordingly, we kept a poultice of boiled onions, with a very little oil in it, constantly applied, which was found to be the most emollient application of several we had tried; and, in about five or six days, from that excessive hardness the excrescences had acquired, they became rather softer than common warts, and without having their size perceptibly increased.

creased. Then, instead of the strong caustics, the excrescences were strewed over with a fine powder of the leaves of the fabina, an application recommended by Astruc, Heister, and some others in slight warty cases, and what I had used often for many years past, on such occasions, with success: But, as they had always recommended the stronger caustics for the warty excrescences of any considerable size, where the knife could not be conveniently applied, so simple an affair as the *pulvis sabinae* came of course to be neglected, till now, when it proved much more successful than the strongest caustics that had been used. It was put on in the morning, and the poultices of boiled onions at night, which prevented any hardness from coming on; and, before the application of the fresh powder the next day, the patient himself used to scrape off with a knife a good deal of a whitish slough, brought on by this escharotic, and which diminished their size so fast, that, in three weeks, they intirely disappeared.

UPON his recovery, the glans was so scarred and shrivelled up, that it did not appear above half its natural size; but, in a few weeks, it became as plump and well shaped as ever, and had not the least vestige of a cicatrice upon it.

FROM the above case, and some others I could produce, one may be allowed to infer, that strong caustics are improper applications for the taking off venereal excrescences of the warty kind, especially if they are large; for, when they are so small, as that the effects of the caustic can reach to the bottom of the wart, in one, two, or three applications of it, then we commonly succeed: But, even here, I think the sabina preferable, in being more certain in its success, and giving less pain to the patient: Whereas, if one should fail with the caustics, which is often the case, when we are obliged to use them for any considerable time, and the excrescences begin to harden in the manner above mentioned, then there is no end to their application.

IF, notwithstanding the loss of substance from the incrustations brought on by the repeated applications of the caustics in the above case, and which were carefully paired off every morning before the caustic was again applied, the warts should not seem to diminish; and if, after their use was laid aside, and emollient poultices applied, they should not appear larger; then one would be led to imagine, that their size was kept up by the oscillatory motions of the small vessels by which they were nourished, being considerably increased by irritation from the caustic; or, in the more common phraseology, a flux of humours being brought on the parts from the irritation, caused their growth to be, at least, equal to the loss of substance by the caustic.

## ART. XVII.

*Account of the Lisbon Diet Drink in Venereal Cases, by Dr DONALD MONRO, Physician to St George's Hospital, London\*.*

**T**HE physicians at Lisbon, in Portugal, are generally believed to be possessed of the secret of preparing a particular diet-drink, or decoction, which is more efficacious in removing these venereal complaints that frequently remain after salivations, and the free use of mercury, than any other hitherto known; which has made many in this country desirous of knowing its composition; and, therefore, I have sent you a receipt of one kind  
of

\* Read January 1766.

of those decoctions, which a practitioner in Portugal, who was in great repute for curing venereal complaints by such drinks, allowed the gentleman who gave it to me to copy from his books, under promise that he would not discover it while he remained in that country: As it agrees in the principal ingredients with two other receipts which came from Lisbon through different channels, and were both believed to be genuine, we have the more reason to believe it to be the true receipt of, at least, one kind of the decoctions used there. It is as follows:

*R Rad. sarsaparil. santal. alb. atque rub. singulorum ʒiii. Glyceriz. et mezerei, singulorum ʒss. Ligni Rhodii. guaiaci, et sassafras, singulorum ʒi. Antimonii crudi ʒii. Misce, et infunde in aq. fontanae bullient. lib. x. per horas 24, et dein coque ad lib. v. Colaturae capiat aeger a lib. is. ad lib. iv. quotidie.*

I make no doubt but that the physicians at Lisbon have different receipts for  
prepa-

preparing drinks of this kind ; and, as it is alledged that some of these decoctions cure the venereal disorder without the previous use of mercury, which none of the plain decoctions used here have been found to do, it is probable that some of the practitioners at Lisbon, who prepare these drinks, sometimes add privately the solution of the corrosive sublimate, or some other preparation of mercury.

IT should seem, that several of the ingredients in the above decoction are useless, and might well be thrown out, and the medicine still retain all its virtues ; but I have sent it you as it was given to me.

I have only as yet tried it in the following case, where it had a very good effect.

A young gentleman, between twenty and twenty-one years of age, contracted a venereal infection in march 1763, which appeared, at first, in form of chancres round the neck of the *glans penis*: He immediately went to a surgeon, who gave him pills, and applied dressings to the  
fores,

fores, which removed those complaints; and, in the beginning of July, he was declared to be cured, and remained seemingly so for four or five weeks; at the end of which time, a swelling began to appear in his groin, which was removed by rubbing it with mercurial ointment, taking some doses of physic, and applying poultices of bread and milk to it. After this, he thought himself well for some months; but, at last, began to perceive an ulcer in his throat, which he at first mistook for the effects of a common cold, and neglected it, till it had spread considerably; and several small ulcers appeared on his tongue. Being then convinced that these symptoms were owing to the remains of his venereal complaint, he put himself under the care of a surgeon, who has a great deal of practice in the venereal way, who gave him pills; of which he, at first, took two at night and one in the morning; and afterwards, three at night, and two in the morning; and, at the same time,  
ordered

ordered him to drink a quart of fassafras tea in the day. The pills, after some days, caused a very bad taste in his mouth, made his gums very sore, and threw him into a salivation; and, after some weeks, the symptoms went off, and he was thought to be well; but the disorder soon broke out a fresh: He then had other medicines, and continued under this surgeon's care for above twelve months; during which time, the ulcers often seemed to heal, but broke out again always in a few days, till, at last, those in his throat got well; but those in his tongue became more numerous; and the tongue began to grow hard, and to thicken on its sides, and more in the right than in the left side; and it became very uneasy to him to move his tongue.

IN that situation, he applied to another surgeon, who, after giving him medicines for about a fortnight, and finding his complaints grow daily worse, brought him to me to have my advice, on the 2d October 1765. At this time, his tongue  
was

was hard and swelled, particularly on the right side, it was very painful, and covered with a number of small ulcers, and appeared ragged, and as if it was threatening to become cancerous. I advised him to take first a dose or two of cooling physic, and afterwards to drink daily a quart of the Lisbon diet-drink, made according to the above receipt.

HE began the use of the decoction the 12th of October; and, after drinking a few bottles, he found himself sensibly relieved; and, by the time he drunk twenty-nine, all the ulcers were gone; his tongue was reduced to its natural size; he felt no uneasiness or pain; and he had all the appearance of having received a perfect cure. After this, he took no more medicines; and I did not see him till the 8th of December, when he came to return me thanks for his cure; when his tongue was perfectly clean and soft, and seemed, in every respect, like to the tongue of a person in perfect health; and he said, it had been in that state for above four weeks; and he had not the least symptom  
of

of a relapse. He has continued well ever since January 1766.

As I have only used the decoction in this one case, we cannot thence affirm, that it possesses all the virtues attributed to the Lisbon diet-drinks; nor, till further trials are made, can we even assert, that it is more efficacious in the cure of venereal complaints than the decoctions of sarsaparilla root, or of guaiac wood, which are in common use.

A R T.

## ART. XVIII.

*Observations on the Catarrhal Epidemic of 1762, by EBENEZER GILCHRIST, M. D.\**

THE catarrhal epidemic of 1762, compared with some other constitutions of the same kind, was far from being so frequent and fatal. That of 1729 happened in winter; and, for some time, increased the bills of mortality at London to about a thousand a week. The weather was thick, warm, and rainy. In 1733, the half of the inhabitants of a town were laid down at once, and almost whole families were seized in a

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night;

\* Read June 1764.

night; scarce one person remaining free in the morning. All were affected with heavy sickness, or the special and more aggravated symptoms of catarrh. This, perhaps, was the most universal disease ever known, and irregular in its progress. It appeared in America in October; at Edinburgh, and in Switzerland, in December; in London, Paris, Flanders, and Ireland, in January; after that, in Italy. In these two constitutions, the aged, infirm, asthmatic, and phthical, suffered greatly. We have had several returns of the disease since; the last, the mildest of them all, and slowest in its progress, which in Britain was regular from south to north. In some of the former, their greatest spread was over in a few weeks; but this continued some months before it was extinguished in these parts; and as many escaped as were seized with it. Old people and children were less the subjects of it than adults.

WITH us, the disease appeared in April. At first, one only here and there  
were

were seized, and, for the most part, very slightly; but spreading, it became afterwards, particularly in June, more general and severe. In the course of the season, it gradually declined both in strength and frequency; and autumn probably put an end to it every where.

THE symptoms commonly were, slight fever, beginning often in the night, seldom in a very sensible way, with a small degree of heat; a little oppression in breathing; and, toward the morning, a disposition to sweat. Next day, a general languor and lassitude were felt; with dull heavy pain of the head, especially the fore part; a bruised like feel all over the bones; weight, and often pain at the praecordia. The eyes were watery and swelled. There was a running at the nose, sneezing, sore throat, tenderness along the wind-pipe, cough, expectoration of clear phlegm, prostration of appetite and spirits; and all these were attended with a soft pulse, somewhat full, and scarcely more frequent than the natural.

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The tongue was milky and moist, and the urine citrine. letting down a whitish or claggy sediment.

IN this simple form, the disease was generally so mild, and often trifling indeed, that very little medicinal care was necessary, except where delicacy, or some other circumstance, demanded it. The kindly warmth of the bed, moderate sweatings, or, which the sick were disposed to, plentiful perspiration, sustained by proper drinks, quietness, soft diet, a little wine, and keeping the body easy by clysters or laxatives, never failed very soon to carry off the disorder; which left no complaint, except a degree of weakness, for a short time.

THOUGH this, in general, was the constitution of it, great varieties were observed. Sometimes there was a small degree of fever, with cough, and a kind of *pleuritis notha*, without other catarrhal symptoms; and these yielded to bleeding, warm purges, and the *empl. calidum* applied to the part. At other times, there was a heaviness, and dull pain of the  
head;

head; wateriness of the eyes; a constant and copious running at the nose, and sneezing, for a day or two, by which all was carried off. Some had fore throat, and swelling of the fauces externally, with very little fever, and a little or no cough. Others were, at first, seized with an intense pain of the balls of the eyes; and some, of the outside of the lower jaw, attended with considerable tumour; but there was no cough or affection of the *membrana sicckderiana*.

SUCH were the appearances proper to it as a catarrhal illness. Labouring people, by exposing themselves to the air and weather, and following, as long as they were able, their different occupations, had plain signs of peripneumony, increased fever, teasing cough, and difficulty of breathing, accompanied with head-ach. These were treated accordingly, with bleeding, lenient drinks, and expectorants, mild purgatives, and blistering, which seemed to have a good effect, as it drew off the acrid predominant serum.

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This observation will probably bring to mind another disease of a lymphatic or catarrhal nature likewise, the measles, in which this affection of the lungs is so frequent, and so often fatal. The resemblance between our epidemic and the disease just mentioned, is still more evident from the increased secretion in both, of irritating matter from the eyes, nose, throat, and lungs; and also from this circumstance, that when, in the former, the sweats were indiscreetly stopt, a hectic fever came on, as frequently happens in measles.

FOR, after a space of ten days, a fortnight, three weeks, and sometimes a good deal more, a good many, not submitting to be confined, found themselves, when the catarrhal symptoms were gone, in a worse condition than at first. There was now a more sensible fever, increasing at night. The pulse, though accelerated, grew neither full nor strong. The tongue was dry, rough, and brown. They had thirst, with loss of appetite, looked ghastly,

ly, and wasted fast, without any increased evacuation. Sometimes, pressed with their illness, they were obliged to take refuge in bed for a day; which gave just so much relief as enabled them to keep up a few days longer; when the same necessity again forced them to bed, and with the same relief. Thus, sometimes better, sometimes worse, they went on a great while. Some have been known to languish under it a year, and, at last, recover, without any assistance.

IN such a situation were those, in other places, who, as I was informed, long after the original disease seemed to be gone, the distinguishing symptoms of it being gone, continued in a languishing state, under some other malady they imagined, and the event was doubtful. The first idea of the disease seems to have been lost in the change of appearances, though essentially it remained the same. A proof of this we have in the method of cure, which was alike in all cases. For, notwithstanding the change, and an improper treatment, the disease, even in these

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circumstances, was still very tractable. A gentleman, who laboured under it four months, was directed to lie some days in bed, to live on spoon-meats, and use proper drinks. Every six hours, he took a bolus of *pulv. contrayerv. comp.* with a few grains of camphor, and a neutral draught. When the course was finished, he returned to his ordinary way of living, and felt no more of his complaints. Afterwards he used the bark. When a strict confinement was not complied with, by going very early to bed, rising late, and carefully using the remedies described, the disease went off, though more slowly.

To take another view of the distemper, it will not be amiss to consider it still farther in combination with other diseases of the season: "In some cases," says a correspondent, "I have seen the catarrhal complaint and the intermitting fever complicated; and these cases were always attended with uncommon lowness, anxiety, and pain about the *præcordia*. They all ended in regular intermittents

termittents, and were cured by the bark." A like observation I find in an account of a similar constitution in 1742. The author thus expresses himself: "Some had a mixture of the late malignant spotted fever with it. Such, beside the signs of catarrh had a wretched, low, weak, small, ticking pulse; a pale or ghastly look; and less heat and thirst." Whether these symptoms are constant, and characteristic of such complications, experience must determine.

SOMETIMES there was a translation of the disease. The degree of peripneumony, which so often happened, shews how readily it was translated to the lungs, where the simple inflammation caused by it was, when timely attended to, easily removed. But, when it falls upon the glandular system of the lungs, the matter becomes more fixed, and tubercles are formed. Only in two instances, indeed, did I observe it terminating fatally in a consumption.

FROM great irregularities after seizure, a boy had the fever protracted to the

fourteenth day, with very high symptoms. The last week, there was a constant pain in the middle of one of his thighs, where nothing however could be seen or felt. On recovery, which was very slow, and without any sensible crisis, he wanted the use of the whole limb, which was not, till after some time, restored.

IN another case, it seemed highly probable, that, without forming, the disease was thrown upon the nervous system, and caused a mania to a high degree.

FROM the history of it, then, it is evident, that, contrary to a vulgar opinion, this epidemic is not merely a simple catarrh, or cold, such as daily happens from sudden chills, or changes of weather and seasons, and a stoppage of perspiration, but must be considered as a fever *sui generis*, with catarrhal symptoms, for the most part regular in its course, terminating in a sensible crisis, continuing long sometimes after every symptom of catarrh is gone, and often changing its form.

IT would appear too, that, like measles or chincough, it is produced and propagated

gated by contagion in the air, distinguished from that infection which is communicated by morbid bodies, as in the small pox and malignant fevers. With regard to this, we can only form an indeterminate notion of a deleterious aura, wafted about every where, and affecting numbers suddenly, in different places at the same time. From no manifest qualities in the air, its heat, cold, moisture, or dryness, is the cause to be deduced; consequently, no good rule of practice can be established in reference to these.

It seems to be the genius of the distemper, to exert its strength chiefly on the lining membrane of the nose, fauces, and trachea, the eyes, and, more or less, the glands about the jaws and throat, causing sometimes considerable tumor. Neither, for this, can we assign a reason, any more than why mercury so constantly affects the salivary glands, often with excessive tumour, in some sort, resembling that species of catarrh, with us termed the Branks, in the other part of our island,

island, the Mumps. In both cases, there appears to be a fusion, or corruption of humours, which now become unfit for animal uses, are thrown upon the proper excretories, and discharged.

WHATEVER may be the material cause of the disease, it must be of a less fixed and adhering kind, which the blood, weakly retaining, is disposed to throw off, at once, by sweating, unsolicited, and without force, or the formal process of a tedious coction. And here, if the parallel is not too far urged, the sweating sickness occurs to which indeed it has but a remote affinity in a mild degree of the great and astonishing symptom, sweating. This, however, in both was spontaneous and critical, took place from the beginning, and, when prevented in the one case, occasioned much disorder, and certain death in the other.

NOR is it less remarkable, that, laying aside its original form of catarrh, it should have subsisted so long under another form, without any farther change, or falling  
oftener

oftener on a particular part: And that, after fo long a time, it was fo speedily carried off by the fame eafy method appropriated to the cure of it in its primary form.

THE difeafe, in this chronical ftate, very much refembled a febricula, or lurking fever; which is often met with, and goes on many weeks, without altering its fhape, being hardly perceivable by the pulse, thirft, or any preternatural heat. A fmall whitenefs of the tongue, and higher colour of the urine; fleeplefs nights, without ficknefs, pain, or reftleffnefs; langour, and flow wafting; are its fymptoms. Many, as in our fever, are neither fo ill as to be confined, nor fo well as to keep up under it. And, like that too, it is eafily cured by lying in bed, diaphoretics, and the neutral mixture; befides which, bliftering is requifite. By comparing the epidemic with this little fever, I was led to the cure of it in its hectic ftate.

THOUGH, in its general conftitution and progrefs, there is no malady more  
fimple

simple and uniform than the present ; yet, from the moveable condition of the matter of it, which is easily expelled or retained, and differently determined, many times it became various and perplexing. Regarding it in its more genuine form, as deviating from these, as complicated, and undergoing a translation, such was the diversity of appearances in it, so much did it often assume a resemblance to other distempers, and sometimes seem to be transformed into them, that it may be justly reckoned a true proteiform.

HOWEVER mild and tractable the disease was in itself, for, under good management, it cured itself, by neglect or mismanagement, it frequently drew after it some very uneasy, and, though rarely, even fatal consequences. On the contrary, duly treated, and timely submitted to, it proved, to some, a means of better health than they enjoyed before. Indeed, it might have been expected, that such an universal depuratory fever should have brought about a general confirmed state of health for a long time. And this,

this, it is probable, would have been the case, had an universal good management taken place. But, as no danger was apprehended from so slight a malady, seldom were those cautions observed which only could render it salutary, and prevent a bad consequence.

IT was observed, that the disease exerted its force chiefly on the membrane of the nose, fauces, and *aspera arteria*. But, from the continuity of this membrane, and some particular circumstances, there is ground to believe, that the *primae viae* were in the same manner affected. A great deal of the morbid humour must likewise have been swallowed; by which the gastric and intestinal juices could not fail to be vitiated. It is not improbable, therefore, that, leaving a taint upon the fluids, and impairing the several digestions, it laid the foundation of many after ills, of a slow kind; and perhaps caused, or influenced not a little, the epidemics that succeeded. Never, at least, did I observe pains in the stomach and sides,  
with

with wind, indigestion, costiveness, or looseness, and wasting in consequence of these, so frequent and distressing, continuing so long, and so little obedient to remedies, as since that time. A colic also prevailed, with severe gripes, great flatulence, and more or less inflammation of the whole, or part of the belly. Some were costive, and suffered extremely. In others, it was attended with dysentery, or bilious flux.

IN all popular illnesses, then, of this kind, when their course is finished, a proper method ought early to be pursued, in order to cleanse and rectify the disorders of the first passages, strengthen the digestive powers, and correct the indisposition of the fluids. This seems to be particularly necessary in delicate and impure bodies, in those who have been improperly treated, and where there is a weakness of parts.

ART.

## ART. XIX.

*Observations on the Arthritis anomala, with a Postscript, relating chiefly to the cure of the regular Gout, by the late DAVID CLERK, M. D. Fellow of the Royal College of Physicians, Edinburgh.*

**A**LTHOUGH the gout is known to be a common disease, yet I am persuaded, that it is much more common than either authors or practitioners generally allow. It is commonly reckoned a distemper peculiar to the decline of life, and rarely to be met with among those of younger years: But I am convinced, from my own observation, that it is nearly as general among people under the age of forty; and that even the age of thirteen or fourteen is not entirely exempt from it.

By the gout, however, I do not mean that perfect kind of it alone, which is certainly much more frequent among elderly people, viz That painful swelling of the extremities, which gives so much relief to people afflicted with other ailments, and which Sydenham, and other authors, have chiefly described. I mean by gout, not only that, but likewise the *arthritis anomala*, or irregular gout, which Musgrave, in his two books \* on this subject, has so much enlarged upon.

As the true and most salutary seat of the gout is in the extremities, especially the feet, so the *arthritis anomala* is that disease, when seated in other parts of the body.

THE *arthritis anomala*, I would divide into two heads. The one, is the gout, which, from a weakness of some of the inward parts or from other causes, takes its original seat in these parts; and is either some considerable time before it gets

\* De Arthritide symptomatica, Exoniae 1703. 8vo.; et, de Arthritide anomala, Exon. 1707. 8vo.

gets to the extremities; or perhaps never arrives there at all. The other is the gout, which, having left the extremities, retires into different parts of the body, and produces a variety of different symptoms. The first kind, I would call the *arthritis anomala imperfecta*; and the last, the *perfecta*.

THE *perfecta*\*, or perfect kind, though at different times it takes the shape of almost every other disease; yet it is, for the most part, very easy to be known. But the *imperfecta*, or imperfect kind, is hitherto very little known; and is scarcely taken notice of by any other, except Musgrave.

HE calls it the *arthritis symptomatica*, having had a different notion of the subject from what I have; and he reckons up a good many different species of it, which he had himself met with in his practice; such as, the gout proceeding from the *chlorosis*, from the dropsy, the *melancholia*,

\* By Musgrave, called simply, the *arthritis anomala*.

*cholia*, the *morbus hypochondriacus*, and *arthritis fixa scorbutica*, the *lues venerea*, the asthma, fevers, the colic, and from cutaneous diseases.

HE supposes, that the *causa continens*, or *materia morbifica* of these diseases, by being differently modified, either puts on the appearance of the gout, or becomes the gout itself; and, in some, he supposes, that the *materia morbifica* of the gout and of the other disease unite together, and form a disease different from either of them. In general, they require a method of cure different both from that of the gout, and of the symptomatic disease; and indeed, he always sets down the method of cure under the different species which he mentions.

I will not say, however, that all the species which he enumerates come so properly under my plan. In some of them, the symptomatic disease seems to be only a predisponent cause of the gout which followed. But, in others, the symptomatic disease seems to be as much  
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the real gout, as any species of the *arthritis anomala perfecta*, which every body allows to be the gout.

As the cure of the *arthritis anomala imperfecta* is different from the cure, either of the gout, or the disease which it personates, (though it agrees, in some measure, with the cure of the *anomala perfecta*, which is generally known), it is of great consequence to be able to distinguish it. In some cases, it will remain for many years in its disguise, before it show itself in the ordinary shape to be a true gout; and, as the symptoms it occasions are sometimes very violent, it is a great chance but the patient dies of an improper method of cure, before the nature of the disease is known.

I shall, therefore, proceed to relate some cases of both the kinds of the *arthritis anomala*, and afterwards to make a few remarks upon them, with a view to improve the diagnosis and method of cure of the *anomala imperfecta*.

SOME years ago, I attended an unmarried lady, A. B. turned of thirty, who  
had

had never been subject to any disease, except feverish colds, and likewise a pain of her side which was thought to be nervous: She had also been subject to a moderate degree of the *fluor albus*. Several of her nearest relations had been gouty; tho' neither her father or mother were so. She was seized in the spring with a swelling of one of her great toes, not discoloured, but painful when she walked; and she knew nothing that had given occasion to it. I advised her not to apply repellents or strengtheners to it, for fear of its being the gout. She accordingly did nothing with it for some months, till at last, being tired of confinement from so trifling an ailment, she applied spirit of wine to the toe. It soon removed the swelling; but, upon that, her health grew worse, and the pain afterwards went into her back: Her health had been better than common from the time her toe first swelled. She bore with a pain in her back for some time, because, I advised her not to meddle with it, till I should see

of

of what kind it was. However, of her own accord again, she rubbed it likewise with spirits which dissolved it. Immediately after this, about the end of August, she was seized with violent sickness, vomiting, and pains about her stomach and bowels, and afterwards with a severe strangury; which last, with these new disorders about her stomach, attacked her by turns. Nothing seemed to give her much relief against the strangury, except a glyster of *decoctum commune*, with camphorated oil, which used commonly to put it away in an instant; but drove the pain immediately into her stomach. Upon that, she used to take the *spiritus æthereus Pharmacop. Edinb.* a tea-spoonfull of which commonly dislodged it from the stomach, and sent it back to the urethra. Sometimes laudanum was used, which gave her some relief. The pains were chased in that way betwixt these two places, when they were violent; but sometimes the medicine sent the disease to her head, where it occasioned violent

pain

pain and giddiness. Therefore, when the strangury or stomach-ailments were not violent, the inward repellents were not used. She commonly had a sweat or moisture upon her skin, which often gave her intervals of ease from all her complaints. Blisters, applied to her ankles, gave her considerable relief, and were therefore several times used. By these means chiefly, we brought the gout a little down; but could never get it farther than her thighs or knees. She continued all the winter in the way I have just now mentioned; and it was the end of June before she was able to venture abroad; and, even then, she was not free of the above complaints, especially the strangury. She came afterwards, by the use of exercise, mineral waters, and other remedies, to enjoy an indifferent kind of health; but I hear that she never got rid of the difficulty of making water; though she came to make it without pain. The gout never returned to her feet, at least, in any considerable degree. Dr Cullen sometimes visited this  
lady

lady along with me, through the course of that winter, when she was so ill.

SINCE that, I had another unmarried lady, C. D. for my patient, who was between forty and fifty years of age, and was very corpulent. She had the gout flying through her, sometimes in her feet, occasioning pain and swelling in them, sometimes in her stomach, in the shape of sickness, vomiting, and cramps; at other times, attacking her breast like an asthma, or her head, with pain and confusion; and sometimes it was in the urethra, in the shape of a strangury. When she had the strangury, she was always free, or, at least, easier of her other ailments. This lady was treated much in the same way as the other; though the cure was directed principally towards her stomach; her other complaints, and the strangury too, not having been so violent. Since her recovery, she has been valetudinary, and subject to slight returns of the same ailments.

AT the same time, I attended a lady, E. F. of twenty-three, who had had slight touches of the gout for four or five years,

but had always put it away, by setting her feet, when pained, in cold water. I was called to take the charge of her health, on account of cramps and violent disorders of her stomach, which she had been much troubled with for several years. I attended her for some time, before I knew, or before any body knew, that she had ever had the gout. This lady had likewise fits of stangury like the others, but not so violent or constant as they were in the case of A. B. She had also the *fluor albus*. These two patients Dr Cullen likewise attended along with me.

AFTER that, I was called to a gentleman, G. H. turned of forty years of age, and whose father had been very gouty. He, having exposed himself to rain and cold about fifteen years ago, was seized, at that time, with the ordinary effects of a cold; but which, some time afterwards, ended in violent cramps of his guts, and a difficulty of making water, though he had no pain when he made it. These two ailments had harrassed him for four-

teen

teen years together, though with intervals of hours, days, and even months, in which he enjoyed perfect health, except with respect to the stoppage of urine, which never left him at any time, so far as he remembered. He consulted many different physicians, at different times; but they could never make any considerable impression upon his disease. Sometimes, when they gave him entirely over as dying, he unexpectedly recovered, and became quite well all of a sudden, without knowing any cause for his recovery. Upon considering the case, and deliberating what might be the cause of his distemper, I recollected the gouty cases, which I have just now related, where the strangury, or stoppage of water, was an attendant symptom, while the gout was lodged in the stomach or bowels. I therefore suspected his disease might to be the gout, and gave him some hopes of recovery, which he had entirely despaired of. Dr Stork having, among his other high commendations of the cicuta, recommended it likewise in gouty cases,

though

though he does not speak of it as being proper for bringing on a fit of the gout; and I having seen it once myself perform a great cure of some extraordinary symptoms, by producing the gout, in the case of I. K. where I had given it inwardly as a discutient for some swelling on his forehead, as large as nutmegs, without suspecting, at the time, that the patient had any thing gouty about him: On these accounts, I determined to try the hemlock, to see if there was any gout in the case, whether it would bring it to the extremities, or, at least, what effects it would produce. But, as he had at the time, besides very violent fits of the cramp in his guts, a vomiting likewise, several times in a day, of a great deal of a pituitous or gelatinous kind of stuff, which gave him relief from the pain, I gave him a vomit. After that, I gave him a dose of rhubarb and mercury. Then I began him with the hemlock, giving one pill at bed-time, containing  $2\frac{1}{2}$  grains of the powder of the leaves of the plant; but,

but, at the same time, I ordered him, every morning, a dose of *tartarus solubilis*, in twelve ounces of water.

As the cramps, and the vomiting of that glairy stuff, went on without abating, and as he imagined that the salt hurt him, by occasioning gripes, I left it off, and gave him the hemlock alone evening and morning; but increased the dose of it to two, and, at last, to five or six pills. He had not taken it a fortnight, when the cramps, vomitings, and stoppage of water entirely left him; and the gout appeared, occasioning a swelling, redness, and pain in the great toe of one of his feet. From that time, he had perfect health, and good spirits for above two months, the gout continuing always in one, or both of his feet, and sometimes likewise in his hands. These gouty pains and swellings were never so considerable as I could have wished; nor did he, in any way, take proper care of himself, trusting too much to the hemlock, and thinking that he was never to have the cramps again. However, upon  
going

going out before the gout had thoroughly left his feet and hands, and having got cold, besides having eat so as to occasion an indigestion, the cramps in his bowels returned; and, notwithstanding the use of the hemlock, they continued for some time, so as that he was obliged to have recourse to large doses of laudanum and spirit of hartshorn, as formerly, and likewise to vomiting with warm water, upon which the glairy stuff mentioned before appeared in as great quantities as ever. As long as I knew any thing about him, he never had any return of the stoppage of urine, except two days during the time of his relapse; on which two days he happened, by accident, to omit the use of the hemlock.

A gentleman, L. M. aged about thirty, several of whose nearest relations had been gouty, was, for several years, subject to disorders and pains of his stomach, especially in spring and autumn; and having tried a variety of medicines without relief, consulted me about his complaints. Upon questioning him, I  
found

found that he had had slight touches of the gout in his feet, at different times; which, however, he had never properly attended to, thinking the pains were too slight to be gouty. I ordered him half an ounce of the *elixir sacrum*, to be taken every second night. This had a very good effect upon him, in so much, that it not only cured him at the time, but allowed him afterwards to use much more freedom in eating and drinking than he could ever do before. Next spring, his stomach-ailments were slighter, so that he neglected to use the elixir; and, upon their going off sooner than the usual time, he was seized with a very copious gonorrhoea, the matter of which was ill coloured, and did not rope: It was not, however, attended by a strangury, or heat of urine. He was much alarmed, as he had no notion that it could be of any kind but the venereal, though, at the same time, he was pretty sure there was no reason to think he had acquired it in the ordinary way. Upon examining all the circumstances, and finding that there was

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little or no reason for thinking that he had got it in the ordinary way; that his stomach had been well since it had appeared; that he had had flight touches of the gout in his feet formerly; and that others of his family had been gouty: I say, upon considering all these circumstances, I suspected that his gonorrhoea was a discharge of the gouty kind. I told him so, and that I would endeavour to cure it as such, in place of using the antiphlogistic method he had been accustomed to in venereal gonorrhoeas, and which always considerably hurt his constitution at the time. I accordingly gave him no medicine but the *elixir sacrum*, in the same way as formerly; and, in about ten days or a fortnight, he seemed to be well. However, soon afterwards, having gone sometimes a hunting, and ridden smartly, he imagined he had hurt one of his testicles in taking a leap; for it was immediately seized with a considerable swelling and inflammation. This last ailment was cured by bleeding, some doses of the *infusum amarum cum senna*, fomentations,

tions, and a hemlock-poultice. No mercury was used, and he has kept free of venereal complaints, and indeed of ailments of every kind, ever since, though it is now fourteen months since he was cured.

### R E M A R K I.

THERE are several diagnostic signs of the *arthritis anomala imperfecta*, some of them general, and some of them peculiar to the particular species, to be picked up in Musgrave's book *de Arthritide Symptomática*: But they are exceedingly imperfect; and I do not recollect his mentioning any instance where he knew the disease, before it appeared in its natural shape in the extremities, or of there being any probability of knowing it beforehand. He only, after it is known, and when it is turned into the shape of the *anomala perfecta*, directs the method of cure.

DR PRINGLE, in his excellent book on the Diseases of the Army \*, gives a diagnostic sign of this distemper, as communicated to him by my father, the late Dr John Clerk, and which had not before been observed by authors; viz. white ropy filaments floating in the urine, which, when taken out of it, are pellucid, and, when dried, turn to a kind of calx.

As a strangury, or, at least, a difficulty in making of water, was a leading symptom, not only in the first four cases which I have related, but also in others of which I neglected to take notes at the time when I attended the patients, I think it may be presumed, that this symptom may likewise be looked upon as a diagnostic sign of this distemper. Indeed, so far as I have observed, it is a mark of the disease, only when it is seated in the stomach or guts. No doubt, the disease may sometimes be lodged about the bladder or urethra, without affecting any other of the

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\* Part 3. c. 2. § on the rheumatism.

the bowels, and so the difficulty of making water be the only symptom. But my patients had all of them, at least at times, if not chiefly, affections of the stomach or guts. I do not say either, that, when the gout is lodged in the stomach or guts, the stoppage of urine is a constant attendant upon it; I would only say, that it is often so. The stoppage or difficulty of urine, mentioned above, is often so slight, that it may be termed more properly a dribbling of urine; the person being only longer about making of it than ordinary. And the usual slightness of this symptom is the cause that few patients, especially female ones, will mention it to their physicians, unless they are particularly questioned about it.

It may be objected, that a stoppage of water is an ordinary symptom in several other diseases; and, consequently, that it is too equivocal a sign to be made use of as a diagnostic in the *arthritis anomala*. But is not a pain of the side allowed to be the chief sign of a pleurisy, though

though it is common to several other distempers? There are few diseases that can be distinguished by one sign, without joining other circumstances along with it. All that I contend for, is, that this symptom, when joined with other marks of the disease, may assist us in distinguishing the *arthritis anomala imperfecta*.

THERE is one singularity in the arthritic strangury, or stoppage of water, to be noticed, which is, that, though blisters are very apt to produce an ordinary strangury; yet, in this one, blisters applied to the ankles, so far as I have observed, are one of the best remedies for removing it.

## II.

WHEN arthritic people are seized with a vomiting, upon the gout's leaving the extremities too suddenly, I have observed, that it was commonly a whitish, gelatinous, or pituitous kind of stuff which was thrown up, like what is mentioned in the  
case

case of G. H. This is only to be observed, when the stomach is otherwise empty; because, if either food or medicines have been taken soon before, its appearance will, of course, be prevented: And this may be the reason why Musgrave, and other authors, have not taken notice of it. Besides, I do not say that the vomiting is always of that kind; as I have seen it of a different kind myself. However, if it shall be found to be commonly the case, I think I may set down this kind of vomiting as another diagnostic sign of the *arthritidis anomala imperfecta*.

### III.

IN relating the case of L. M. I have taken notice of what I think a new species of the *arthritidis anomala*, and which may be referred to both the *perfecta* and *imperfecta*, viz. the *gonorrhoea arthritica*. If that gentleman's disease had been of  
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the venerical kind, he could scarcely have been cured by the method that was used, or, at least, have so long after continued well.

I was afterwards informed, that Mr De Sauvages, in his *Pathologia Methodica*\*, among the different species of gonorrhoeas, mentions the disease I speak of, under the name of *gonorrhoea podagrica*. Accordingly, I found that he mentions it, but not that he had seen it; as he only sets down Musgrave as his authority. I have since looked over Musgrave's two books, but I could find no such thing taken notice of in either of them.

I imagine I once met with the same disease in a young gentleman, about ten years ago; but, as I had neither the same experience, nor the same ideas about such diseases

\* Edit. tert. Lugduni 1759, 8vo. The same author, in a later work, his *Nesologia Methodica*, Amstel. 1763, 8vo, where he ought to have taken particular notice of it, makes no mention of it at all; I suppose, because he found afterwards, that there was no such thing in Musgrave's book.

diseases at the time, I cannot be so positive about it; having taken up the case then in a different light.

## IV.

I imagine, that the *fluor albus* may sometimes be of the same nature with the disease which I have just now mentioned, viz. the *gonorrhoea arthritica*. It is a distemper which women are excessively subject to, though they very rarely speak of it to their physicians, unless it happens to go to a great height. If the gout appears in that shape in men, it is to be expected that it would do so much oftener in women; because, for several reasons, it has a less chance of forming properly in their extremities. Before it form well and regularly in the feet, it requires to be well nursed with heat, and great attention to be given it upon its first appearance. But women very seldom do this; because they either do not imagine their swellings can be gouty, on account of their being attended with less pain than

than in men; or, if they do, there are many of them that would rather risk the danger of putting away the swelling, than be at the trouble of clothing their feet well enough for the purpose, which are commonly but very slightly covered, and, of consequence, apt to be cold.

IF this is the case, that the *fluor albus* is sometimes of the gouty kind, we see one reason why that disease should be sometimes difficult of cure, unless it be attended to at the time that it may proceed from this cause, as well as from others; as it becomes necessary on this account to treat it then as an irregular gout.

WITH respect to the cure of the *arthriti anomala imperfecta*, as the chief intention is to bring the gout down into the extremities, it ought to be much the same with the cure of the other genus of the *arthriti anomala*, and must be varied accordingly in the different species of the disease. Musgrave, in his two books, has very fully delivered the cure of the *anomala perfecta*; therefore, I need not insist much upon it. I have, upon  
dif.

different occasions, tried many of the medicines which he recommends, and have often found them successful; sometimes they failed, especially when the same patient, who had found relief from them at first, was obliged to continue the use of them for some time. When that happened, I had recourse to other medicines; two of which only I shall mention at present, as I have sometimes found them of great service when the stomach was chiefly affected; viz. common black pepper, and the aether, or *Spiritus aethereus* of our dispensatory. The pepper is given in powder to the quantity of a scruple or half a drachm in a wafer; or a lesser quantity of it is mixed with some chicken-broth, or beef tea, which will sometimes make them stay on the stomach, when every thing else is thrown up. Of this aether, I used to give for a dose, one or two tea-spoonfuls \* in a lit-

\* I mean, of that which is made in Edinburgh; for there is a cheaper kind of it made in great quantities at Liverpool, and sold over the most of Britain, which is much weaker, and not near so effectual.

tle water, and to repeat it occasionally.

BESIDES, I cannot pass unnoticed the effects of the cicuta, in the cases of G. H. and I. K. For, from these cases, it seems probable, that the hemlock is possessed of a virtue of bringing the gout from different parts of the body into the extremities, at least, in some cases, and in some constitutions. If G. H. could have been prevailed upon to take proper care of himself, especially till the gout had left the extremities of itself, I am persuaded I would have made a thorough cure of him at the time, as I did in the case of I. K. though indeed his disease was not of so long a standing.

*P. S.* As it is two years since I read the above paper, I must now remark, that I have ever since been attentive to the circumstances contained in it; and that any observations I have made upon the subject have, in general, been agreeable to what I have there advanced, and that I have little or nothing to retract of what I wrote at that time.

WITH

WITH respect to the cure of L. M. I must observe, that he married soon after; and that, except a slight return of the pain in his testicles, a small degree of his old stomach disorders, and lately an ordinary fever, he has kept free of every other ailment, without ever having taken any mercury.

As to what relates to the virtue which the hemlock may be possessed of, of bringing the gout down into the extremities, I have since tried it in a good many cases, and have found, that it sometimes succeeds, though it oftener fails. But, if it answers sometimes, it is so far useful, as it is quite a harmless medicine, and requires no regimen but what is otherwise proper for the disease. In one case, which there was reason to think a gouty one, the cicuta performed a cure, by removing the symptoms, without producing a regular gout. This patient, N. O. had been long subject to a lumbago, which, at last, having left her, was succeeded by a numbness and sense of coldness in the belly

belly and thighs, and a fluggilhnefs of the bowels themfelves, attended with a very confiderable lofs of memory. Many powerful remedies had been tried, without fuccefs, before ſhe got the hemlock. The doſe was never increaſed above twelve or fifteen grains twice a day, and ſhe was well in about four months; but ſhe continued it about a month or fix weeks longer. She took no other medicine during the uſe of it, except the following laxative, which was neceſſary every ſecond night, as ſhe was coſtive.

*Rx Crystal tartari dr. ſ. Sal. polychreſti. gr. xvi. Aloes ſocotr-nae gr. xiv. Terebinthinae ven. gr. iv. Syr. de althaea q. ſ. ut. ſ. maſſa dividenda in pilulas xiii. quarum capiat i. ii vel iii. prout reſponderint, alternis noctibus.*

I muſt likewiſe take notice of another medicine, which I have lately tried, and found uſeful in inward gout, where the ſtomach was affected, viz. a ſtrong infuſion

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sion of tanfy-leaves. I used to give about four ounces of it for a dose; or half that quantity, if the stomach will not receive more. I the more willingly mention that medicine, as it is likely, at present, to prove a fashionable preservative against the gout in this part of the country, on account of its having answered well in two cases, which I shall here relate, as I had them from the people themselves.

THE first is of a gentleman, P. Q. who is naturally pretty full and strong, is as yet under fifty, and had his first fit of the gout about fifteen years ago. After that, he had a severe fit every winter, which confined him always two or three months at a time; and, for two or three years, he had a return of it likewise in the summer season, so as to confine him about a month. After using, unsuccessfully several methods of cure, which had been recommended to him, he, at last, about seven years ago, began to use an infusion of tanfy. His method has always

ways been, to take the leaves, flowers, and small stalks of dried tansy, and to fill a teapot with them of such a size as to contain an English pint; then to fill up the interstices with boiling water in the morning; and, after it has stood in infusion all day, to drink it off cold at going to bed. For these seven years past, he has continued constantly taking the tansy in that manner, and has never since had any thing of the gout, except once, about five years ago, when having accidentally sprained his ankle, he was seized with a fit of the gout; but which was so slight, that it never prevented his walking through the house with a staff. He did not intermit the use of the tansy during this fit; but continued it as usual. He says, that the tansy has never operated upon him, by occasioning any sensible evacuation, either by sweat, stool, or urine; for, though he sweats every night, he did so before he began his cure: However, as he has two easy stools every day, I suspect that must be owing to the tansy;

fy ; as it is extraordinary in any body to be naturally so loose at his time of life ; and he cannot recollect with any certainty, what was the state of his belly before he began to use that medicine. He never bathes his feet, but only cleans them once a week with a wet cloth, and rubs them with a flesh-brush every evening and morning. He clothes himself well ; but is obliged, by his office, to sit for the most part of the day, both in summer and winter, in a very large cold room, and far from a fire. Besides keeping free of the gout, he has had extremely good health in every other respect during all that time, and has eat and drunk every ordinary kind of meat and drink, without distinction ; except claret, which indeed always disagrees with him, though he can drink small beer, strong ale, punch, red port, and white wines, without any inconvenience.

THE other case is that of a wig-maker, R. S. a very stout, agile, little, man, aged 52. He was seized with a sciatic  
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and rheumatic pains about twenty-eight years ago. About fifteen years ago, he was attacked by a regular gout, which used to confine him every winter from one to four months. He tried several remedies, with a view to prevent or lessen the fits; but the one which he found of most use, was a tincture of gum guaiac in brandy, twenty drops of which, taken evening and morning when the fit was upon him, used to put it away in three or four days. As he was told, that this method of cure might be attended with danger, on account of its sudden operation, without producing any remarkable evacuation, he only used it in some fits; besides, he never took it in the intervals. At last, having accidentally met with Culpeper's *Pharmacopoeia Londinensis*, printed Lond. 1659, and observing in it, that tansey was recommended for the gout, he immediately began to eat fresh tansey leaves every morning; and, when he had got some of the same dried, he drank a weak infusion of it with milk and sugar every morning to breakfast, in place of common tea. This method

thod he has continued for three years past, eating always a little fresh tanfy in the morning for two or three months during the season of it, and drinking near an English pint of a weak infusion of the dried leaves the whole year through. He has not only kept entirely free of the gout, since he began the tanfy, but has, in other respects, enjoyed very good health, though he never observed any remarkable evacuation from the tanfy.

As these two patients are well known in this city, a good many gouty people, some of them persons of distinction, have begun to follow their example in drinking of tanfy. The method most commonly used, is, to drink about half an English pint of it at bed time. With some, it seems to act as a laxative; with others, as a diuretic; and, with others, it has no sensible operation at all. Many of them entertain great hopes of a perfect cure from this medicine. For my part, I will not pretend to determine what success it will have. However, I think it is probable, from the nature of the dis-

ease, that no universal cure will ever be found for it; and that such medicines as strengthen the fibres, and, at the same time, gently evacuate the gouty humours, bid fairest for success. Constitutions are extremely different one from another; and, as in almost every other disease, it happens often, that different remedies must be used with different patients, it is not to be expected that it should be otherwise in this disease. It seems probable, that the tanfy will answer very well with some constitutions; but I think it is as likely, that other remedies will be found to answer as well, or better, with other constitutions. In confirmation of which, I shall relate a case, wherein a very different medicine, viz. lime-water, has proved successful.

JOHN BROWN, porter of the Royal Infirmary, is a tall, stout, full man, of a sanguineous temperament, and aged forty eight. He was first seized with the gout about twelve years ago, which returned upon him once in two years. Af-  
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ter four or five years, he came to have a fit of it once every year, and it lasted longer, confining him commonly six weeks, or two months at a time. The last fit he had was in the autumn of 1761. In January 1762, I advised him to try lime-water, with a view to lessen or remove his gout. He accordingly began to use it at that time, and, ever since, he has not had the smallest return of the gout. His method of taking it is singular; for, about an hour after his breakfast, (which is always of bread and milk), he drinks off an English quart of lime water in the space of a minute, or even less. It never made him sick, or disagreed with his stomach; but it always purges him two or three times before or after dinner. Lately, when it was like to lose its laxative quality, I ordered him to drink four ounces of it more than his usual quart; since which it purges him as well as formerly. Ever since he began to use the lime-water, he has not only had no fit of the gout, but has likewise kept free of every other ailment.

Now,

Now, with regard to the lime-water, if one were to judge *a priori*, it ought to be, in some respects, a good remedy against the gout. For I think there is reason, with some physicians, to imagine, that there is a great analogy between the gravel and the gout; and, as lime-water is known to be an excellent medicine in the gravel it may be supposed, that it will likewise prove a dissolvent of gouty humours, and prevent their breeding in the human body. However, as in most people it is very apt to bind the belly, when taken after the ordinary method, it cannot be supposed that it will agree with gouty people, unless it is drunk in the way that the above patient used it, in order to make it prove laxative, or at least, unless they take some proper laxative along with it, such as soap, or the *elixir sicrum*. For I imagine, that its being a laxative with that patient, can be owing to nothing but his pouring in so great a quantity of it at once, and which very few stomachs would be able to bear.

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BUT, if either the tanfy or the lime-water, or any other medicine, fhall ever afterwards be found to be a prefervative againft the gout, it is not to be expected that it alone will do the bufinefs, without other affiftance. For, as indolence, or want of exercife, together with an excefs in eating or drinking, are the greateft promoters of the gout; fo temperance, fobriety, and exercife, efpecially riding a horfeback, muft be affiftants in the cure. Befides, there are other circumftances, which, though they appear of little confequence, yet may be of confiderable ufe, and which, if neglected, may prevent a method of cure, though otherwife good, from taking effect. It is to be obferved, that P. Q. rubs his limbs twice a day with a flefh-brufh, and never baths them in warm water. And an ingenious gentleman of this fociety, who is himfelf troubled with the gout, and drinks tanfy with a view to remove it, tells me, that he finds a confiderable advantage in bathing his feet, not with plain warm water, but with moderately warm water, to  
which

which a considerable quantity of sea salt is added, which he observes to give his feet an agreeable warmth, and make them perspire much more than they would otherwise do. These, and other circumstances, which I purposely omit, will greatly contribute towards a cure. But, whatever method of cure a gouty patient follows, he ought to be attentive to his own particular constitution, and observe what things hurt and what agree with him, as it is often very different in different people; for no particular directions can be given that will agree with every body.

I shall conclude this paper with the case of a patient of mine, who uses an extraordinary method to put off a fit of the gout when ever it attacks him.

WILLIAM RICHARDSON, footman to a lady of quality, naturally a strong man, and now aged fifty-five, was seized with the gout about twenty years ago. For the first eight or nine years, he had a fit of it once every year in the spring, which used to last above a month. After that,  
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he was told by some body, that he might free himself of the gout, if he would, at its first appearance, eat one or more salted herrings at bed-time, by way of supper, and taste no other food or drink that night; that one herring would cure a slight fit; but that, if the fit was very severe, it would require two or three; that this should be continued for three nights successively, if the gout should not be entirely gone before that time; and that it was necessary to take the herrings straight from the pickle, without washing them, and to roast them. He accordingly followed the prescription, and the first time he was seized with the gout, that he might make sure of success, he eat three whole herrings at bed-time, after the method prescribed, and next morning was so well, as to be able to go abroad about his business; nor did he stand in need of a second night of the cure at that time. Every year since, he has followed the same method, eating three herrings at bed time, when the fit attacked him; and, when he did it at the  
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beginning of the fit, he was always well next day; but if he allowed the fit to go on for some days, it obliged him to have recourse to the herrings for three nights running; however, he was always sure of being well in three days at most. The nights on which he took the remedy, he wrapt his feet in flannel, and they sweated. As the distress for want of drink was excessive in the night, he used to chew some hay or straw, with a view to lessen the violence of his thirst. Ever since he began this method of cure, he has had very good health through the rest of the year, except the first year. For, having been much hurt by a fall from a tree that year, viz. in summer 1750, he lost much of his strength, of his sight, and of his memory; but, by the use of some medicines, and a seton in his neck, he was perfectly recovered before the time of the gout's returning upon him next spring. This present year, his health has been very good, though he had no fit of the gout last spring, as usual, which is the first time he has missed it these twen-

ty years. I never knew above one or two other people who tried this method of cure; but, as they had not fortitude enough to withstand the violence of the thirst, and were obliged to quench it with drink in the night, it did not answer.

VOL. III.

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ART.

## ART. XX.

*Some Observations on the same Subject, by the late ROBERT WHYTT, M. D. F. R. S. Fellow of the Royal College of Physicians, and Professor of Medicine in the University of Edinburgh.*

AS I had occasion, several years since, to write some observations on the many disorders occasioned by an irregular or imperfect gout, in order to illustrate another subject with which I thought it a good deal connected, I have, since that time, been particularly attentive to that matter, and have formed so much the same opinion with Dr Clerk of the effects of the *arthritis anomala*, that, in one sense, at least, I am the most unfit of any in the

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the society to make remarks on his paper ; because several objections may not occur to me, that would present themselves to one of a different way of thinking.

IN confirmation of what the Doctor has said of the gout being a more frequent distemper among young persons than commonly is imagined, it may be proper to mention, I had for my patient, in November last, a girl of seventeen, of a delicate make, who, at that time, had a regular, and very smart fit of the gout in one of her great toes, and in one of her knees. In march last, she had a return of the same disease, although not so highly marked but it might have been taken for a rheumatism. Her wrists were only swelled ; but, before this happened, her stomach and breathing had been greatly affected.

BESIDES the more common symptoms occasioned by an irregular gout, I have met with the following ; viz. a diabetes, or an uncommon flux of pale urine continuing

ning for two or three weeks, a hemiplegia, a mania, palpitation of the heart, a troublesome itching of the scrotum, a dysuria, a running from the urethra, and a pain in the testicles.

I had a patient who never in his life had been affected with any venereal disease, who, for several years, had a small running from the urethra, which often stopped for some weeks or months, and then returned. As this person had once had a fit of the true gout, and had many symptoms which bespoke the *arthritidis anomala*, I was of opinion, that the running was occasioned by the arthritic humour falling particularly on the nerves or vessels of the urethra; whence the motion of the fluids in them must have been increased, and consequently, the secretion from the nervous organs must have been more copious than usual.

I have met with three cases of a pain in the testicles from an arthritic cause. In one of these, the left testicle was much swelled; but this swelling went off, upon

a regular fit of the gout coming into both the feet and both the hands.

IN page 444 Dr Clerk mentions it as a singularity of the arthritic strangury, that it is not increased, but removed, by blisters applied to the ancles. I have several times observed the same thing of a slight strangury in continued fevers.

WITH regard to the anti-arthritic virtues of the tanfy, I can say nothing from my own experience. As to the extract of the cicuta; after taking it constantly for three months, for a glandular swelling, I was obliged to give it up on account of a faintness at stomach, flatulence, and other complaints attacking me, which, from experience, I know to be owing to the gout. This seems to shew, that the cicuta has no conspicuous anti-arthritic powers. Neither can lime-water be looked on as possessed of this property; for I had, some years since, a patient, extremely temperate, who, after having, for three years running, drunk an English quart of lime-water daily, had a very severe

vere and long continued fit of the gout in both his feet and both his hands. The lime-water seems to have done service to Dr Clerk's patient, chiefly by purging him; and this is the more probable, as he is one of a very full habit of body.

ART.

## ART. XXI.

*Of the Urinary Bladder thickened, by E-  
BENEZER GILCHRIST, M. D.\**

WHOEVER considers the structure of the urinary bladder, its uses, the parts with which it is connected, and that it is immediately necessary to life, will readily perceive a variety of distempers to which it is liable, the great danger that sometimes attends them, and consequently the necessity of a speedy and an effectual remedy.

THE particular affection I mean to speak of, is not often met with in practice, or may not always be certainly known; and

\* Read June 1761.

and therefore is rarely mentioned by authors: Though, considering the greatness of the malady, and that it evidently characterises itself, it ought to be specified under a distinct title of disease incident to the bladder of urine, and very different from those recorded in systems as belonging to it. A more precise term not having occurred by which to denominate it, I have designed it by a very general one, a *thickening* of the bladder; a term badly technical, and not expressive of its real nature or distinguishing symptoms. What is wanting in this respect must be supplied from a description of the disease, and the remarks to be made upon it.

THE urinary bladder may be thickened various ways. 1. From inflammation. 2. From a scirrhus disposition, affecting it wholly or in part. 3. The inner membrane becomes spongy and flabby, when its numerous glands are overcharged, which, in this case, throw out their contents in great abundance: Here we have the idea of a rheum. 4. The sides  
of

of the bladder sometimes grow thick and hard, from a long and rigid contraction of its muscular fibres, by which the capacity of it is so much diminished that it can contain but a small quantity of urine, which, with painful urgings, it is constantly endeavouring to expell. The part is now under a spasm; and, when thus affected, is, by French authors, termed *vessie racornie*. 5. Without any contraction, or having its capacity diminished, which, on the contrary, is greatly enlarged, the whole bladder suffers an uniform thickening of all its coats, or such an increase of its substance as seems peculiar to membranous parts. This is what I have in view, which a few histories will more clearly explain.

HIST. I. A middle aged woman, alarmed with her situation, rode a great way for advice, which, no doubt, aggravated all the symptoms. Her countenance, but especially her eyes, shewed a high degree of inflammation; her pulse was quick and hard; she complained of

great heat, with difficulty in making water; and a round hard tumour was felt rising two or three inches above the *os pubis* internally, exceeding painful to the touch. After bleeding and laxative, fomentations, liniments, and proper drinks were used, and the mercurial pill was given; by which the illness was presently removed. This perhaps was no more than a simple inflammation of the bladder, which, however, had it not soon been carried off, might have brought on a thickening of a different kind; and, as the cure corresponded with that practised in the following cases, it was thought proper to give it a place among them.

HIST. 2. A gentleman of seventy, on account of some complaints which he took to be gravelish, drank a purging water. The frequent motions to stool and urine brought on a strangury, and inflammation of the neck of the bladder, to a great height, which did not give way but to repeated evacuations, especially bleeding. A difficulty of urine remained;

ed; and a tumour was formed in the lower part of the belly, under the recti and pyramidal muscles. When I first saw him, it was as large as an ordinary man's fist; felt hard like a firm fleshy substance, and reached almost as high as the navel; but was not at all painful. For the most part, he passed his urine involuntarily, limpid, and in great quantity, so as to give suspicion of a diabetes. These were accompanied with a slow fever, foul tongue, and loss of flesh and strength. What was thought proper in regard to the tumour had been formerly advised; and now some things were directed with a view to the fever; but, none of these availing, he used the mercurial pill, which made him spit a good deal. The tumour yielded; and, in the space of two or three months, altogether went off. To compleat the cure every way, he undertook a long journey, drank Bristol water upon the spot, and returned in all respects well.

AFTER five years of uninterrupted health, having rode in bad weather, and  
in-

incautiously changed his cloaths, he was seized with a strangury and a total retention of urine, but without any symptoms of fever. Two days spent in the use of common remedies brought no relief. The bladder was now much tumified and painful. He loathed medicines, and refused them. The mercurial pill was given every night. After a second or third dose, the pain began to abate, and the urine to come away dripping, at last pretty freely, but involuntarily. By degrees, he became free of all pain; but the tumour remained. Though various accidents, as well as the disease itself, had brought him into circumstances of great distress and danger, nature seeming to decline fast, he returned in three months to his house in a pretty good state of general health. Here he indulged himself in walking, often in wet grounds, or cold weather; and sometimes had a return of strangury. A dread of all food or drink, that he apprehended might increase his illness, betrayed him into a neglect of diet,

diet, followed by an entire prostration of appetite; by which he was in a short time so much reduced, that it was impossible to restore him. He died, without pain or sickness, of a marasmus, from mere inanition. The tumour was somewhat diminished; but liberty was not granted to inquire into the state of it after death.

HIST. 3. A gentleman near sixty, in winter, began to complain of difficulty of urine, for which, during spring and summer, he used diuretics and soap remedies. In autumn, he felt a fullness and stiffness in the lower part of his belly, which made it uneasy to him to stoop. New symptoms arising, and all his complaints being now much increased, I saw him in October. He had frequent inclinations to make water, which he made in large quantity, and of a greenish colour, with fierce heat all along the urethra. The bladder was greatly tumified, so as scarcely to be comprehended by a full grasp of the hand. It rose as high as the navel, and felt of a firm fleshy

fleshy consistence about the neck and fundus, but renitent toward the middle; and the whole of it, especially the upper part, was exquisitely painful. On feeling by the anus, a hard tumour was discovered about the neck of the bladder. An oily nitrous mixture gave present relief, as to the heat of urine, and kept the belly open. A small bleeding shewed the blood a little fizzy, and seemed to moderate symptoms; but a second, still smaller, gave neither the same appearance in the blood, nor the same relief; and his pulse flagged. The tumour and inflammation were great; there was no room for evacuations, nor was any time to be lost. The only recourse left, that could be depended on, was the mercurial pill; by a few doses of which, a sensible abatement of pain was procured. Baths and fomentations, after repeated trials, were likewise found to cause greater tumefaction of the part, or an uneasy inflation of the belly, and therefore were laid aside; as was every thing else, except the pill. His mouth grew ill tasted, and  
slightly

slightly sore; and to this pitch it was determined to keep up the effect of the medicine for some time. In a few weeks, he was able to walk about easily in the house; the tumour gave now little pain. The heat of urine had been for a great while gone, and he could retain it better. In this promising way, on a sudden change of weather, he was seized with universal rheumatism; which, with very little mitigation of pain, lasted three weeks; and afterwards he often had slight returns of it. This was succeeded by a periodical vomiting of bile, continuing for some days, and returning once in two or three weeks; from every fit of which he very hardly recovered. A fevere catarrh next attacked him, and incessantly teased and exhausted him. Nature was not able to bear up under a complication of so many and so great diseases. He died in May, with all the appearances of extreme old age. Little time was allowed to inspect the body; and our inquiries were restricted to the  
part

part principally in question. About half an English pint of urine was found in the bladder, which lay quite flaccid, not embracing its contents; and might have contained thrice that quantity. It had a perfect coriaceous appearance, like that of raw hides steeped in water, white, smooth, and shining; and was near one fourth of an inch thick, and remarkably firm. The neck of the bladder was scirrhus, almost cartilaginous, and formed into a pretty large, oblong, uniform tumour. It is to be observed, that the patient never had stools but when solicited, occasioned by the pressure of the tumour upon the rectum; which, on one side, was distended into a large pouch, where the foeces lodged. The liver was very large, abounding with bile. Had not other supervening diseases concurred to render his recovery impossible, the original one might have been overcome to a still greater degree, and life prolonged; under painful and disagreeable circumstances indeed, depending upon causes only

only to be palliated, never entirely removed\*.

HIST. 4. A gentleman drank a good deal of punch in the afternoon, which he passed freely. Going into company in the evening, he had frequent inclinations to urine, which, from delicacy, he restrained. When he went home, he attempted to make water with many efforts, but in vain. About midnight, he called for assistance. There was a fullness and pain to the touch above the *os pubis*, and a strong pressure on the neck of the bladder. A catheter was several times introduced with great ease, and brought away about eight ounces of blood beginning to coagulate. But there was no appearance of urine. Under apprehension that inflammation might, or already was come on, ten grains of calomel were given. Clysters and fomentations were used; and he took frequently of a julep, composed chiefly of *spir. mindere-*

\* A parallel history from Guarinonius may be found in the Sepulchret. Anatom. tom. 2. p. 662.

*ri.* The pulse was not affected; therefore the quantity of blood brought away by the catheter was thought sufficient to render bleeding unnecessary. Next day, in the afternoon, his urine began to drip from him; and he had stools in the night, by means of a laxative apozem. The fullness, pain, and pressure, however, seemed to increase, though the urine was still coming away, and in greater quantity. The tumor of the bladder became considerable. Eight grains of the mercurial pill were given every night, and commonly procured a stool or two: The apozem was sometimes interposed, and the julep was carefully continued. By these, in eight or ten days, all immediate danger was prevented. The urine came away in pretty good quantity, but involuntarily; the pain abated; and the fullness was diminished. His mouth became watery, not sore; and the pill was continued, so as to keep up the effect for a good while. He came, by degrees, to retain his urine, and have the power to expell

expell it; which was assisted by strengthening remedies, and by going out every day in a chaise. In about three months, the disorder seemed to be entirely removed.

HIST. 5. A lady laboured ten days under a retention of urine before she asked advice. There was no fever, or uneasiness, except from the fullness in the hypogastrium. She had cautiously abstained from liquids. A purgative, and some diuretics being given, without effect, the urine was drawn off by a catheter, as often as needful. She took the mercurial pill every night, till her mouth was sore, using, at the same time, the *spir. mindereri* in good quantity. When, by this method, the bladder had a little recovered its use, she rode on horseback, and soon recovered.

HIST. 6. An aged gentleman, under retention of urine, had the catheter introduced early in the disease; but no urine came away; and afterwards it could not be introduced. The tenth day the mercurial pill was given, and repeated

ed every night, which, in a few days, a good deal affected his mouth. All this time he made no water, and was much distressed from the fullness of his belly. About the fifteenth or sixteenth day, he began to pass urine involuntarily, and in large quantity; but he was now so much reduced by pain, and the long continuance of the disease, that he soon died. Whether the discharge of urine was owing to the obstruction being resolved, or a relaxation of the parts, or both, I will not determine.

ACCORDING to the different orders of vessels they are found to occupy, and the particular condition of the fluids proper to them, tumors of different kinds are formed, inflammatory, lymphatic, fatty, indurated, or of some other species not easily determined, and sometimes of a mixed nature. Such as depend upon obstruction in the arterial vessels, being immediately under the power of the heart, or force of circulation, soon terminate, and have various issues. Those a-  
gain

gain which are placed beyond the first and great system of vessels, suffering no immediate impulse from the blood in the arteries, sometimes continue long increasing, or at a stand, before they are brought to a termination; till the tumors, acquiring greater acrimony, or distending the vessels more, cause greater irritation, fluxion, and inflammation, with tumor of another kind; in which case it becomes a complicated disease.

A membrane, regarding its structure and appearance, seems altogether to resemble a tendon, perhaps with this difference only, that the fibres of the one, running parallel to each other, are collected into a bundle, strong and compact; while those of the other, disposed in different directions, or interwoven, are spread out into a larger surface; and, from the nature of the part, we form a very different notion of a tumor here from one in a fleshy part; as that of a bone must greatly differ from either.

THIS membranous tumor may be produced, either by congestion, as it is called,

led,

led, or in a speedy way, when particular causes concur to hasten it. The urinary bladder was, by the ancients, reckoned the coldest of all the viscera, deriving its heat principally from the surrounding parts; and, being supplied with few blood-vessels, was said to be *exsanguis*. As, therefore, there can be but a small force of circulation from arteries, the motion of the fluids in those very minute vessels of which it is composed will be proportionably slow. And, when there is a languid circulation of the fluids in general, as in old age, or a bad habit, those juices, which are destined for the nourishment of the part, and the secretions to be made in it, become still slower in their motion; and, in time, there will be an accretion. Hence, a gradual thickening of the coats of the bladder, which notwithstanding may continue to perform its usual functions. *Vesicas urinae multas crassifictas et duras vidi*, says Guarionius, *quae non, nisi ad morbi hujus cumulum, suam operam excernendae accipiendaeque urinae, amisissent.*

To the same purpose is an observation in Bonetus: *Id ego saepe vidi factum in senectute, ut tunicae vesicae potius coria alba repraesentarent*; which, though I have said that this affection is seldom taken notice of, makes it probable that it is a more common distemper than is imagined; and may it not sometimes be the cause of dysury, or a troublesome excretion of urine without pain, as the word imports, in the aged especially, who most frequently are the subjects of this complaint? For, when the muscular fibres of the bladder, from the thickening of its coats, have, in a great measure, lost their tone, the urine is with difficulty expelled altogether by the pressure of the diaphragm and abdominal muscles. Nor can it be so thoroughly expelled, but that a portion of it always remaining in the bladder will excite frequent inclinations to urine, and perpetually disturb the patient. In a vigorous constitution of the bladder, it is able wholly to discharge its contents by the force of its own contraction;

tion; at least, without any great efforts from the action of the surrounding muscles.

A practical injunction is here plainly suggested. Those frequent solicitations from urine, from inability fully to expell it, ought as much as possible to be resisted or diverted; because, when the urine is more collected, the bladder, suffering greater distension and irritation, is more effectually stimulated to contract and empty itself. The same injunction is no less necessary in the opposite state, when the bladder has its sides thickened from a rigid contraction of its muscular fibres, by which the capacity of it is lessened. The indulging of every motion to urine, perhaps with forcible strainings, augments the rigidity, lessens the capacity still more, and aggravates the distemper.

BUT there is another way in which the disease is brought on, and makes a far quicker progress. Let us imagine the orifice of the bladder straitened, or intire-  
ly

ly shut up, by inflammation, or tumor of any kind, so as to cause a retention of urine. The whole substance of it will be increased, partly from the spreading of the obstruction, but chiefly from the distension of its sides; by which all the vessels are stretched, and enlarged every way, laterally as well as longitudinally; and now, rendered more capacious, a greater quantity of fluids is suffered to flow into them. Hence it is that membranes, kept constantly in a state of distension, are observed to grow thicker; as appears in the uterus during gestation and incysted tumors; in which the investing membrane, at first of a delicate texture, in time becomes surprisingly thick and strong. Guarinonius found the bladder in thickness equal to the middle finger of a man; and, in history third, when most inflamed, perhaps it was more\*.

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\* A young gentleman informs me, that he saw a case in the Royal Infirmary at Edinburgh, accompanied

IT will set the disease in a clearer light, and obviate a mistake one may be led into, to remark, that the great bulk of tumor we sometimes feel, notwithstanding its firm fleshy consistence, is not the bladder itself thickened into such an enormous size, a thing hardly conceivable, and life at the same time to be preserved : It is owing to the accumulation of urine, and this not being discharged in proportion as it is secreted ; for it comes away but in small quantity at a time, by the force of its own pressure, and the resistance of the bladder ; which, thus constantly distended by the urine it contains, and greatly enlarged by the thickness of its coats, forms an excessive tumor, hard, massy, or renitent, more or less according to circumstances.

THOSE

nied with a palsy of the lower extremities, in which the bladder was found to be half an inch thick. The tumor extended to the navel and the patient, for the most part, passed no urine but by means of the catheter. In this case, a blister applied to the *os sacrum* gave relief ; and, for some days, the urine was discharged without the assistance of the catheter.

THOSE who have never seen the disease, not conceiving, perhaps, how a thin membrane, as is that of the bladder, can be thickened into such a remarkable tumor, may be imposed upon, and apt to mistake it for one of another kind, within the peritoneum, or between that and the abdominal muscles, or in the muscles themselves. But it is pretty certainly distinguished by the following signs. Besides its situation in the middle of the hypogastrium, and its arising from under the *os pubis*, where it is attached, it is more distinctly circumscribed and rounded. The tumor has an oval form. It is moveable, which can hardly be supposed of any other tumor in this place. And it was very observable in history third, though not mentioned there, that, instead of falling down to the side on which the patient lay, as, from its weight, we imagine it should have done, it mounted up to the *os ileum* of the other side. This can only be accounted for from the intestines falling under

under the bladder, which reached as high as the navel, and pushing it upwards, The tumor is felt of a different bigness at different times, according to the greater or less quantity of urine contained in the bladder; which will be according to the quantity of drinks taken, or a freer discharge of the urine at one time than another. And, when the tumor is not too tender to bear the experiment, the urine may be squeezed out by compressing the bladder. If to these we add pain and difficulty in passing the urine, a retention of it, or an incapacity to retain it, no doubts with regard to the distemper can remain.

WHETHER the *vesicae durae* of Hippocrates may be reckoned the same, or to have an affinity to the present disease, it is not of importance here to inquire. It would appear, however, to be a distemper of pure inflammation; while ours is altogether a membranous tumor, without inflammation, except what is accidental; though these may mutually be the cause of each other. A membranous tumor,

mor,

mor, indeed, of the bladder has been found to exist long before there were any evident signs of its being affected. But, when the tumor arrives at a great height, and accidents concur, it will bring on inflammation, chiefly about the neck and fundus, where the parts are more fleshy, or more covered with fat, and consequently more susceptible of inflammation. On the other hand, inflammation neglected, ill treated, falling in with a particular habit and state of the juices, or merely by compressing the smaller orders of vessels, may occasionally be the cause of a more general infarction, and likewise produce a membranous thickening of the bladder. A membrane, after inflammation, is always found thicker.

As to the method of cure, I have related what was found most successful in those cases that fell under my observation. In such a delicate situation of things as hath been represented, many would have questioned the propriety of a mercurial remedy; and I should have doubted of it likewise, if experience, in  
cases

cases of no less delicacy, had not long before convinced me both of its safety and utility. A less powerful deobstruent did not appear adequate to produce those great and speedy effects which the vehemency of the distemper required. Besides, I made choice of the most simple and harmless preparation of mercury, in which its parts are only divided, so as to enter the minutest vessels, where they roll smoothly along, without irritation; which, when their shape is altered, and acuated by a saline stimulus, they are apt to occasion, and thereby produce fever, and fluxion upon the part affected. The success sufficiently justified the use of it. Considered as a slow disease, this affection does not indeed cause such immediate danger as when it becomes acute. Sometimes too, as was the case in a history communicated to me, the inflammatory symptoms subdued, it may go off by a long course of time. And, if it should end in ulceration, the constant drain will diminish or remove the  
tumor;

tumor; which happened in another case, likewise communicated; but the ulcer, after many years, was not cured, and commonly proves incurable. For this reason, an ulcer, by all means, ought to be prevented; nor does a fortunate issue, in some rare instances, make the remedy here proposed unnecessary. If the thick-ness is not soon carried off, the bladder grows callous, the humors perhaps acquire a vicious quality, the disease is incurably fixed, or may degenerate into an affection of a worse nature; and the patient will, for life, be subjected to all the misery and inconvenience arising from retentions, or an involuntary emission of urine, besides being constantly exposed to the hazard of inflammation, and its consequences.

WHEN the inflammation does not resolve in a proper time, it must terminate in a mortification, an abscess, a schirrus, or other hardness, of difficult cure, or of dangerous tendency: And, the more acute the symptoms are, the  
more

more assiduous ought we to be to procure a compleat resolution, and thereby prevent a grievous or fatal event. After bleeding therefore, when necessary, and other prerequisites, I chuse, as soon as possible, to throw in the mercurial pill. A dose of eight or ten grains every night, in three or four days, commonly affects the mouth. Even before it is felt in the mouth, it may have a considerable effect. But, when that happens, a revulsion is plainly made, and resolution is begun; in consequence of which, the inflammation and tenderness of the tumor gradually abate; the tension of the bladder and stricture of its orifice relax; the urine slowly escapes, and comes away with less pain; and relief from all the symptoms is obtained. The tumor indeed may not so sensibly decrease; because, though the inflammation is removed, the thickness of its sides will remain, and an incapacity freely to discharge the urine, and prevent the accumulation of it. The total discussion of  
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the tumor is the work of time, in the use of the same remedy, or others, as they are indicated, respecting health in general, or this local affection in particular.

ANOTHER advantage arising from the early practice of this method is, that its effects being speedy and certain, it will often, by making way for the urine, supersede the use of the catheter; the introduction of which, for the most part, is difficult, sometimes impossible; and, when the parts are inflamed, unsufferably painful and dangerous.

BUT when, from old age, a flagging pulse, or want of fever, bleeding cannot be practised, the usual antiphlogistics will be of small use. These, a few excepted, being chiefly coolers and diluents, are deobstruents indirectly, or by chance only; and, too much persisted in, they reduce the force of circulation, by which the obstruction is more confirmed. In a simple inflammation of the bladder, therefore, we are directed not to continue too long the use of cooling and repelling external applications, for fear of a schir-

rus. The same holds good as to internals. Nothing embarrasses more than inflammation in a low state. But quicksilver is a powerful antiphlogistic, and removes inflammation without accelerating the motion of the fluids, which it rather diminishes, by subduing their inflammatory disposition. When there is little or no fever, it as powerfully resolves obstruction, without diminishing the impetus of the blood, on a proper degree of which resolution depends. In this view, experience shews it to be a suitable remedy, equally adapted to the disease in its acute, as well as chronical, state: Provided still there is nothing to forbid the use of it; such as plain failure from old age; a highly wasted habit; or a hectic indisposition. Yet, if the hectic depends upon the obstruction, cautiously administered, it may prove a cure.

THE method recommended may be no less useful as a preventive. A difficulty of urine, a tightness above the  
*pubis,*

*pubis*, and a sense of fulness and tension in the pelvis, causing an impediment to urine, or pain in passing it, are no obscure signs of congestion about the neck of the bladder, or in the bladder itself. In such circumstances, many too hastily have recourse to those things that provoke urine, or dissolve the stone; which are often found rather to exasperate their complaints, than relieve them. Deobstruents chiefly are indicated.

IT need hardly be mentioned, that, through the whole course of a cure, the belly should constantly be kept open. Laxatives, however, or purgatives of the mildest kind, are only to be used on this intention.

EXTERNAL applications are not to be neglected, but must be advised with caution; and their effects are carefully to be observed. Under inflammation, baths and fomentations sometimes soothed and relaxed the parts, and gave a little ease from pain. At other times, notwithstanding a temporary relief, they did hurt, by too much determining the circulation

ulation to the bladder, and causing greater tumor and danger of fluxion. A moderately cooling resolving liniment spread upon linen, laid over the whole hypogastrium, abates the heat and tension. Cataplasms, on the contrary, bruise and fatigue the part; or, growing cold, become disagreeable. When the tumor is indolent, resolvent plaisters, especially mercurial, may be applied; though clysters will more immediately affect the tumor than applications to the abdomen. In any case, injections into the bladder may be of use. But, previous to these, the urine must be drawn off; and, whether they are used or not, a proper catheter ought to be kept in the bladder, to prevent the accumulation of urine; which causes constant distension and irritation, and resists the contraction of the part.

In the declining state of the tumor, when all pain and inflammation are gone, exercise on horseback, or in a vehicle, will be a good means, in conjunction with others, to dissipate the remains  
of

of obstruction, and restore the tone of the bladder. By the easy continued succussion in these exercises, and without any unnatural irritating stimulus, it is gently incited to exert its innate power of contracting itself. Mineral waters likewise may now very properly be directed, and with no small benefit, to hasten and compleat the cure. Where a suitable one cannot conveniently be had, lime-water and the bark may be used.

ART.

## ART. XXII.

*Account of an Amputation of the Arm, without Haemorrhage, by Dr MUDIE Physician at Montrose, in a letter to Dr Montrose senior\*.*

S I R,

WITH this, I send you the account of an amputation of the arm, without any haemorrhage ensuing, and beg that, if you think it worthy a place in the Physical and Literary Essays, you will present it to the society to be inserted, if approved of.

A healthy vigorous woman, 30 years of age, throwing in lint to the rollers of a lint-mill, unluckily had her left hand  
 caught

\* June 1763.

caught by them, and that, with the fore-  
 arm, arm, and top of the shoulder, drawn  
 into these mashing machines. By this  
 misfortune, the fingers and hand were  
 severely crushed, and several of the bones  
 of both broken; the teguments at the  
 wrist tore away; the radial artery divided  
 at the place the pulse is felt; the fore arm  
 and arm very much contused, particular-  
 ly at their articulation; and the *os hume-  
 ri* broken within  $2\frac{1}{2}$  inches of its upper  
 end. I advised the amputation of the  
 limb; which was done, immediately a-  
 bove the fracture of the *os humeri*, about  
 four hours after the accident happened.  
 The teguments, muscles, and bone being  
 cut through, and the tournequet slacken-  
 ed, no blood was squirted from the bra-  
 chial artery, nor could any pulsation be  
 observed at its extremity, though the  
 smaller vessels discharged their contents  
 as usual on the like occasion. The poor  
 woman declared she was not faintish,  
 (for she had lost no large quantity of  
 blood), yet she got the best cordial her  
 cottage could afford, a draught of warm  
 small

small beer, with a little geneva among it; and a sponge dipt in warm water was frequently applied to the stump for half an hour, when no haemorrhage appearing, the dressings, as common, were applied, without a ligature being made on any artery, or so much as any styptic applied. The wound digested well, and was quite cicatrized some weeks ago, which was about  $2\frac{1}{2}$  months from the operation, without ever any flux of blood occurring. And the woman is again in good health.

THE histories by Mr Derante \*, Mr Belchier †, and Mr Antrobus ‡, are uncommon and surprizing, as no profuse haemorrhage happened on the division of such large arteries; yet I imagine the above mentioned instance is fully as extraordinary, and less explicable.

I am, &c.

A R T.

\* Philosophical transactions, No. 370.

† Ibidem, N. 449.

‡ London observations, vol. 2. art. 10.

## ART. XXIII.

*The History of a fractured Sternum, &c.*  
 by Mr JOHN MEEK Surgeon at Fal-  
 kirk\*.

**J.** M. of B——e, aged 74, sometimes  
 subject to inflammatory disorders,  
 with a cough, which, notwithstanding  
 his age, are always greatly relieved by  
 losing  $\bar{v}$ ii. or  $\bar{v}$ viii. of blood, otherways very  
 healthy, in June 1764, had the misfortune  
 of the wheel of a loaded cart going over  
 him; it began at the left shoulder, and  
 went over his breast, slanting down-  
 wards; as was plain by the bluish co-  
 VOL. III. S f f loup

\* Read 1766.

lour of the skin in that direction, by which the sternum, and the three undermost true ribs of the right side were fractured; it also made him throw up a considerable quantity of blood. An almost constant cracking noise was distinctly heard by every one that was within eight or nine yards of him; and, upon examination, I found it was caused by the edges of the fractured sternum grating on one another; for, by laying my hand on his breast, I could easily feel the under part of the sternum, by every inspiration, pushed past the upper part, which had very little sensible motion; and, with expiration, returned in again so far, that, with my fingers, I felt the fractured edge of the upper part of the sternum.

WHEN, with my hand, I endeavoured to keep the under part of the bone, that it could come no farther out than into a line with the upper part, it caused such a kind of uneasiness, as made him both breathless and faintish; and he  
could

could not endure to have it held so above two minutes at one time.

I saw him about half an hour after he got the misfortune; at which time he was cold and faint, as he had not got quite the better of the insensible state he was in for some time after the wheel went over him. I ordered him a draught of warm weak negas, and caused warm flannels to be wrapt round his legs, and hot bricks laid to his feet; yet, notwithstanding, a pretty severe rigor came on, which was followed with a fever, and very great difficulty in breathing.

I must frankly own, that this patient's case seemed to me desperate, considering his age, the injury done, and impediment given to the motion of the lungs, &c. and the absolute impossibility of keeping the sternum fixed in its proper place, that the callus might generate. But as no case, however desperate, ought to be neglected, I resolved to do all I could for this patient; and for that purpose, as his pulse became full, I took some blood from him, and repeated it *pro re nata*; gave  
 emol.

emol. laxative glysters, also small draughts of *spir. minder.* and *sal. nitri* dissolved into water-gruel for his ordinary drink; in short, I kept him strictly to the antiphlogistic course, both in medicines and diet. Stupes wrung out of oxycrate were laid over the injured parts, and then a bandage was applied gently tight around the body.

He could by no means lie in bed; for, in whatever posture he was put, his breast gave him so great pain, that he could not endure it: He was therefore placed in an easy chair, with his body inclining gently forwards, and another chair set before, with pillows on it for him to rest his head on. This posture he was kept in mostly for ten days; about the end of which time the fever and spitting of blood began to abate, and the violent pain became rather easier; but the grating noise of the fractured bones was much the same as at first.

HE had a pretty severe cough for some time before he got this fracture; but,  
what

what may seem strange, it then almost entirely left him, although it might naturally have been expected that it would become more frequent, from the additional obstruction given to the passage of the blood, &c. through the lungs. Does not this illustrate the observation of Hippocrates, that a greater pain destroys, in a considerable degree, the feeling of a lesser one? for I have often, during these first ten days, seen him almost choked with defluxion; and, when ever he attempted to cough, he used to mutter out, for he was scarce able to speak articulately, that the pain went to his heart. But now, the pain being a little relieved, the cough became very troublesome, and made the fractured bones crack so on one another, that he used to say there was something breaking within him, and made, at times, the pain return with violence; all which made anodynes necessary to procure him a little ease.

ABOUT this time, *viz.* ten days after he met with this misfortune, we began  
(he

(he being then greatly emaciated and worn out by fatigue) to put him every night into bed, where he rested himself in a half reclining posture, for three or four hours, when it became necessary to put him into his former position in the easy chair; for, if he remained long in bed, he grew very sick.

ABOUT three weeks after he got the fracture, the grating noise of the bones was very little perceived; and, in four weeks more, he was able to walk about by a hold.

AND now the sternum and ribs, notwithstanding the motion they had, are so straitly united, that it could not be distinguished they had been fractured, were it not for a small ridge that is all along the callus.

HE has, ever since, considering his age, been pretty healthy, only in the morning he is always sick and squeamish, which generally goes off in about an hour after he gets out of bed; and, if the weather is hazy, he is breathless, and frequently

frequently harrassed with a troublesome cough, which, at times, makes him throw up blood. Nothing that I have tried relieves all these complaints so much as losing, when his strength will admit,  $\text{ʒiv}$ . or  $\text{ʒv}$ . of blood.

ART.

## ART. XXIV.

*The Case of a Person who was seemingly killed by a Blow on the Breast, recovered by Bleeding and the Warm Bath, in a Letter addressed to Dr Alexander Monro, sen. by WILLIAM ALEXANDER, M. D.*

SIR,

**A**S the following relation may perhaps throw some light upon the agency, or at least upon the usefulness of the warm bath; as it is the history of a case, in which bathing was perhaps never used before; I shall make no apology for communicating it, especially as I know I am writing to a gentleman to whom even the most distant hint of medical knowledge is always agreeable.

IN

IN the year 1762, while I was quartered with the second battalion of the Surry militia, in the village of Wellenborough, county of Northampton, two of our men happened to quarrel in an alehouse. In the scuffle, one of them struck the other so violent a blow on the breast, that he fell down, seemingly dead. I was immediately called to him; and on my arrival, which was in five or six minutes after he had received the stroke, found him laid on a bed, without any appearance of respiration, nor could I feel any pulse, either at his wrist, or any other part of his body; so that I concluded the circulation to be almost intirely stopt.

In this situation, I tied a ligature pretty tightly round his arm; but the vein did not swell below it, as it usually does when the blood circulates in a proper manner, which was a fresh proof of its stagnation. I made, however, a large incision into the vein in the state in which it was, but no blood issued from it.

AT this instant, considering what I should try next, and looking round the room, I spied a large horizontal bathing tub in a corner among some lumber. When a man is hardly beset with difficulties, he will lay hold on any expedient to extricate himself. This was the present case. I therefore ordered the tub to be filled with warm water as soon as possible; while this was a doing, which took something more than a quarter of an hour, the man remained in the state I have already described, without any other sign of life, than some degree of natural heat, which had not hitherto left him. But, in about three minutes after he was put into the bath, the water round the orifice of his arm began to be tinged with blood. In two minutes more, the blood issued out from it very perceptibly. In seven minutes, he began to breath; and the stream of blood was now projected five or six inches from his arm.

HE was kept in the bath a quarter of an hour; towards the latter end of which, he began to speak, breathed pretty

ty freely; and, from the colour of the water around him, was judged to have blooded enough. Being then taken out, he was put into a warm bed, had some sack whey given him, and slept several hours. Next day he got out of bed, was able to walk about; but complained of a foreness in the part where he had received the blow, which, however, went intirely off in a few days.

I am, &c.

London, January 20.

1764.

ART.

## ART. XXV.

*Concerning the State of the Intestines in old Dysenteries, by Dr DONALD MONRO, Physician to the Army, and to St George's Hospital at London.\*.*

**M**OST authors who have lately wrote on the dysentery have alledged, that the inside of the guts is commonly found, after death, without the least appearance of erosion or ulcer; and they seem to think that the former practitioners laboured under a mistake, when they supposed that the intestines were ulcerated or eroded: And indeed, from what had been said about the time I published my *Account of the Diseases which were most frequent in the military Hospitals in Germany* during the late war, I was then  
afraid

\* Read 1770.

afraid of asserting, that I had observed the villous coat of the colon and rectum to be eroded, till I should again have an opportunity of examining the bodies of some who died of this disorder, and was by that convinced that I had committed no mistake. But, having since that time examined the bodies of several, I here send you an account of what I believe to be the state of the intestines of most of those who die of old true dysenteries.

ALTHOUGH, from the symptoms in the beginning of the dysentery, the stomach and small guts should seem to be affected as well as the colon and rectum, and are frequently found with signs of inflammation in those who die in the acute state of the disorder; yet, when it runs out to any length, and becomes what may be called chronic, where the patient wastes daily by a constant purging, the seat of the disease seems to be principally confined to the great guts; and, after death, they are found to be principally affected.

IN all those I have had an opportunity of examining, the injury done the intestines has been confined to the colon and rectum.

THE internal surface of the rectum commonly appeared either entirely black, or covered with a number of large black spots, which have generally passed for so many gangrenes; and a number of such black spots, some larger, some smaller, were to be seen on the internal surface of the colon, up as far as its great sac, into which the ileum enters.

ON examining these black or livid spots, I found that they were occasioned by black dissolved blood, or other liquors, diffused thro' the cellular membranes, situated immediately above the fine villous coat that covers the internal surface of the great guts; and that generally, in the middle of each of these black spots, there was more or less of an erosion of the villous coat. On raising the villous coat at the places where these black spots were, it appeared fine, transparent, and firm; though the cellular membrane above  
was

was black and inky; and, on dissecting away the black cellular membrane, the muscular or fibrous coat of the intestine appeared mostly of its natural colour; though in some places, in one subject, this blackish matter, or dissolved blood, seemed to be diffused through the cellular membranes which connected together the muscular fibres of the rectum. In two subjects, I observed a few black spots on the outside of the great guts, which were occasioned by a diffusion of the same sort of black liquors into the cellular membranes below the peritoneum; but there were no erosions of the membranes to be seen at such places.

IN some of the subjects I examined, the black spots and erosions of the vilous coat of the intestine were very frequent; and I had a figure drawn of part of the colon and rectum which was found in this state, in a patient who died in St George's hospital; and I permitted the late Dr Stark, to whom I shewed these erosions of the intestines and communicated my observations, to have a  
copper

copper-plate made from it, when he was about taking a degree at Leyden. And in one woman, who died likewise in St George's hospital, the villous coat was entirely abraded from the inside of the rectum. After I had kept this gut for some days, and shewed it to several friends, I gave it to Dr Hunter, who still preserves it among his anatomical preparations.

IN a soldier who died of an old dysentery, which he had contracted five years before in the East Indies, together with an abscess of his liver, there were but few black spots on the inside of the intestines; though there was a number of erosions of the villous coat, particularly in the upper part of the colon, which appeared exactly similar to those which are commonly to be observed in the middle of the black or livid spots. I conjectured that there had been originally black spots at these parts; but that the blood, or other extravasated liquors, had been absorbed when the malignancy of the disorder

der had abated ; for, from the first time I saw him, which was some months before his death, what loose stools he had seemed rather to proceed from weak relaxed intestines, and the absorption of matter from the abscess in the liver, than from the remains of the original disorder, the dysentery ; for there appeared to be only liquid fœces without any mixture of blood or mucus.

IN one patient who died of the dysentery, besides the black spots and erosions which were on the inside of the colon and rectum, we found a small abscess, which contained about two ounces of pus, at a place where the colon adhered to the peritoneum on the left side, below the kidney ; and, when this abscess was opened, and the colon pressed, though very gently, near this part, the fœces came through the wound into the cavity of the abdomen.

I could observe no black spots or erosions of the villous coat any where in the small guts of any of the bodies I saw opened ; though here and there there were

little red spots, or some slight marks of inflammation, in one or two.

As the appearance of the intestines of all those I have seen, who died of old dysenteries here in London, corresponded so exactly with what I had observed in Germany, I cannot help believing that this is the most common state in which the intestines are to be found; though particular circumstances and situations may make a difference in the progress of the disease, and of the parts it may affect: And I suspect, that the small tubercles, or little excrescences resembling flat unripe small pox, which were observed on the inner surface of the rectum and the colon, by Sir John Pringle and Dr Baker, in the year 1762, were appearances peculiar to the dysentery which was epidemic that season, and not the common state in which the intestines are to be found in those who die of old dysenteries.

FROM the account I have given of the condition in which the bowels are generally

rally found in old dysenteries, it is not surprising that medicines have little effect after the disorder has continued for many weeks or months ; or that a purging should continue to waste the patient, and hurry him to his grave, after the original distemper has been got the better of; or that such people, when they seem to be in a convalescent state, should be subject to returns of a purging and gripes, on the least excess in point of diet, or exposure to cold, or the commission of very slight irregularities. While the surface of the intestines remains deprived of its fine villous coat, often the mildest excrement proves too great a stimulus to it; and even, where there is a tendency to heal, the least irregularity in diet, or flux of humour on these parts, or an increased momentum of the blood, often irritates the tender parts, and brings on a return of the purging and gripes.

The account given of the state of the bowels evidently points out, that the intentions to be followed for the recovery of such patients, ought to be the same as  
are

are employed to heal ulcerated or eroded membranes in other parts of the body; particular care being taken not to irritate the tender eroded surface of the intestines, by improper food, or strong, or irritating medicines. And the few whom I have seen recover, after we had reason, from the symptoms, to suspect that the intestines were in the state above described, have gradually crept out of the disorder, by living on the mildest easiest digested food; by avoiding every sort of irregularity; by the use of the bark, and mild astringents; and by the occasional use of mild laxative medicines, or soft laxative clysters; and of mild anodyne and opiate remedies, to allay accidental spasms and pain, when there was no fever, nor any danger of costiveness.

## ART. XXVI.

*Treatment of a Polypus in the Pharynx and  
Æsophagus, by the late Mr DALLAS  
Surgeon\*.*

**J**AMES DAVIDSON, aged 68, was admitted into the Royal Infirmary April 9th, 1763, for the cure of a polypus in his throat.

UPON examining his throat, there was nothing preternatural perceived; but, on giving him a vomit, or irritating the fauces, so as to make him reach, a large fleshy excrescence was thrown up into his mouth, as far as to his fore teeth, consisting of four different fangs, joined together by one common root. These  
were

\* Read 1764.

were of a pretty firm fleshy texture, possessed of a good degree of elasticity. He could hardly allow them to remain half a minute in his mouth, as they shut up the larynx, and thereby entirely stopt his breathing.

THIS polypus had, for several years, prevented him from swallowing any thing without much difficulty; neither could he breath so freely, nor speak so distinctly as usual; it likewise occasioned a cough, which frequently forced the polypus into his mouth.

ON the 15th of May last, while I attended the infirmary, the result of a consultation was, that bronchotomy should be performed, that he might breath by the opening made in the trachea, till such time as I should get a noose cast on the polypus. This method of cure, suggested by Dr Monro junior, was the most rational; for the extracting of it would have been improper, because the haemorrhage could not have been stopped, besides the danger there was of  
pulling

pulling away the inner coat of the oesophagus.

AFTER much reflection on the properest ways of fixing the intended noose, occasioned by the almost inaccessible situation of the polypus, I luckily contrived the following instruments, modelled on the ring of Hildanus \*, which answered the purpose effectually. I twisted five small threads, and waxed them together, with which I made the noose, Tab. 7. Fig. 3. of the same diameter with the circular part of the instrument A. Fig. 1. I then conveyed the ends of the thread through the tubes marked B. and brought them out at the lower apertures CC. pulling them till the noose was brought within the ring of the instrument, and entirely concealed within the groove on the inside; this secured the noose from being carried forward with the polypus when passing through the ring, which would have prevented the intended effect.

THE

\* See Hildan. observ. cent. 2. obs. 21. or Heister. chirurg. tab. 21. fig. 6.

THE instrument being thus armed, I placed the patient on a chair, with his face opposite to the light; then holding the instrument by the handle D. and turning the ends of the thread round my fore finger, but so as not in the least to shift the noose out of the groove, I pushed the instrument into the patient's throat, till it reached the pharynx, which brought on the action of vomiting, and thereby forced up the polypus through the ring of the instrument, which was contrived so large as to fill up all the space in his throat. Immediately, on seeing all the polypus in his mouth, I thrust the instrument to the root of it with the left hand, and pulling the threads with the other hand, made a firm noose on it. I then withdrew the instrument, and allowed the threads to repass the tubes B. upon which he swallowed the polypus with the thread, the ends of which hung out of his mouth. The time employed in casting this noose was so momentary, that the patient was in no danger for want of breath.

MAY 18th, in the morning, the noose was thrown off from the polypus by a violent fit of coughing, which brought that excrescence up into his mouth. It was now apparent that the cure could not be accomplished without a double noose, as a single one was in danger of being removed on every fit of the cough. Several instruments for that purpose were tried, but without effect; at last, I constructed one (Fig. 2.) which answered the purpose in every respect.

MAY the 20th, Doctors Clark and Drummond, and Messrs Inglis and Wood surgeons (being convened on account of a cancerous breast, which I extirpated) were present, when my patient with the polypus being brought to the theatre, and placed as formerly, I made a noose upon the polypus in the manner above described. Having withdrawn the instrument, he immediately swallowed the polypus. I then took hold of the extremities of the thread hanging out of his mouth, and formed another noose, pas-

sing the ends over the outsides of the wheels BB. of the instrument Fig. 2. and brought them out at CC. then taking hold of the ends equally, by which the noose was kept exactly between the two wheels, and holding the threads fast, I pushed the instrument over the patient's throat, and carried this noose directly above the other, without irritating the throat, so much as to make the patient vomit, the instrument being previously covered with sponge, and dipt in oil. By this instrument, I could have made many more nooses, if it had been requisite. It may likewise be of service in most cases where nooses are necessary.

THE 26th, the noose continues firm. The polypus has not been thrown up since the last operation, though the patient is much troubled with a cough. He complains much of a stiffness and stricture, with pains about his breast.

THE 29th, I attempted to put another noose about the polypus; and for that purpose thrust over the instrument Fig. 1. with

with the thread which made him vomit ; but, no polypus appearing, I desisted.

JUNE the 14th, the polypus has never appeared ; and this day he was dismissed the house, being free of all complaints.

JULY 27th, I sent for my patient to the infirmary, and examined him before several of the students ; he informed me, that, on the 13th of this month in the morning, he passed several pieces, which he supposed to be coagulated blood ; and a long white substance which he mistook for a worm ; but, on taking hold of it, he found it to be the thread that tied the polypus. I examined his throat, and made him vomit ; but nothing preternatural appeared.

MARCH 29th, 1764, he came to the Royal Infirmary to get some medicines for a cold he had been lately seized with, and, upon examining him, he seemed to be entirely free from any ailments of the polypous kind.

FIG.

TAB. 8. FIG. 1. Represents the instrument for making the first noose.

A. A circular piece of brass  $1\frac{1}{2}$  inch in diameter, the inner side of which is deeply grooved for concealing the noose of the thread (FIG. 3. A.)

B. Two tubular pieces of brass  $2\frac{1}{2}$  inches long, supporting the ring, which is placed horizontally upon them. At the upper ends of each, there is a bit of tin soldered, and made round, so as to allow the thread to slide more easily, and to prevent it from being cut by the edges of the brass tubes.

CC. The apertures where the ends of the thread are brought out.

D. The handle made of strong brass wire, seven inches long, bent a little, that the instrument may be the more easily introduced.

FIG. 2. The instrument for making the second noose.

A. A brass case for the two wheels  $\frac{5}{8}$ ths of an inch broad, and half an inch deep.

B. The

B. The two wheels, over which the ends of the thread pass, after the second noose is made.

CC. The under part of the case, open as at the top, where the extremities of the thread are brought out, and where they are taken hold of.

D. A small hole through both sides of the case, for fastening a piece of sponge to prevent the instrument from hurting the throat.

E. The handle ten inches long, bended like the other one.

FIG. 3. The waxed thread.

A. The noose exactly adapted to the size of the groove in the ring Fig. 1.

BB. The extremities, or cross ends of the thread.

ART.

## ART. XXVII.

*Sequel of the above case by Dr ALEXANDER  
MONRO, junior, M. D. and Professor of  
Physic and by Anatomy in Edinburgh.*

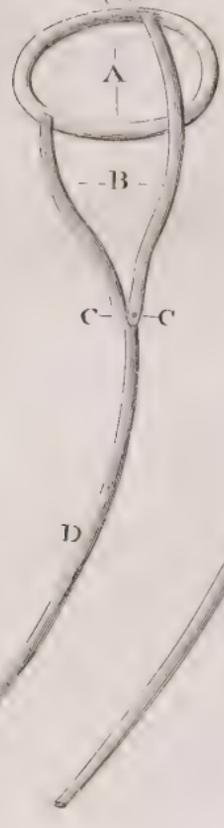
**I**N April 1765, I was informed that James Davidfon had died in the Royal Infirmary, to which he had returned, a few weeks before that, very feeble and emaciated; as for several months past he had not been able to swallow any solid food, and even swallowed fluids with much difficulty. The polypus had not however been seen by the surgeons who had examined his throat.

ON dissecting his body, the oesophagus was found to be greatly dilated by a very large fleshy excrescence or polypus,

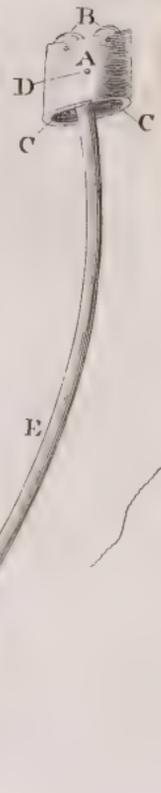
1874

Year	Month	Day	Particulars	Debit	Credit	Balance
1874	Jan	1	Balance forward			
1874	Jan	15	Received of A. B.		100	100
1874	Jan	20	Paid to C. D.	50		50
1874	Jan	25	Received of E. F.		25	75
1874	Jan	31	Balance			75
1874	Feb	1	Balance forward			75
1874	Feb	10	Received of G. H.		50	125
1874	Feb	15	Paid to I. J.	25		100
1874	Feb	20	Received of K. L.		75	175
1874	Feb	25	Paid to M. N.	100		75
1874	Feb	28	Balance			75
1874	Mar	1	Balance forward			75
1874	Mar	5	Received of O. P.		100	175
1874	Mar	10	Paid to Q. R.	50		125
1874	Mar	15	Received of S. T.		75	200
1874	Mar	20	Paid to U. V.	100		100
1874	Mar	25	Received of W. X.		50	150
1874	Mar	31	Balance			150

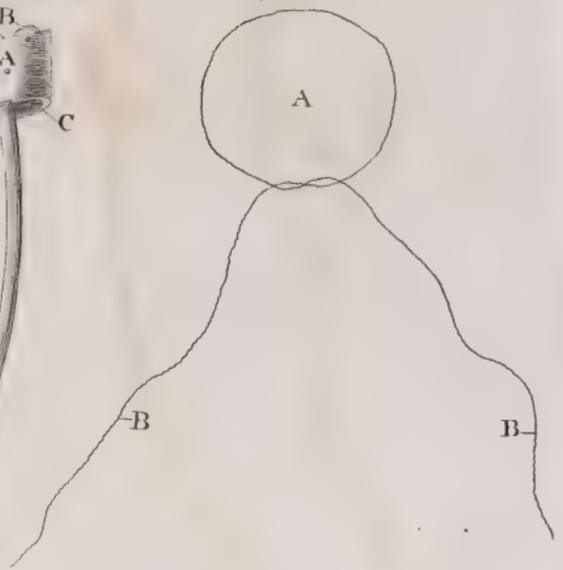
*Fig. 1.*



*Fig. 2.*



*Fig. 3.*



pus, which grew out from its fore part, by a single root, about three inches lower than the glottis, but was split at its under part into several lobes, the largest and longest of which reached down to the upper orifice of the stomach.

See Tab. 8. in which A. represents the tongue, B. the epiglottis, CC. the dilated oesophagus cut open, D. the root of the polypus; E, E, E, E, E, E. the lobes into which the polypus was split.

ON viewing this figure, it is evident, that when, by the effort of vomiting, the polypus appeared in his mouth, its parts must have been inverted, or that the lobe which was longest, and generally undermost, had been thrown up into the mouth. And, as a certain proof that such inversion had actually happened, a cicatrice could be distinctly observed at the under end of the longest lobe, from which the four branches or fangs mentioned by Mr Dallas had been cut off, by the ligature he had applied. This cicatrice is delineated at the letter F.

It

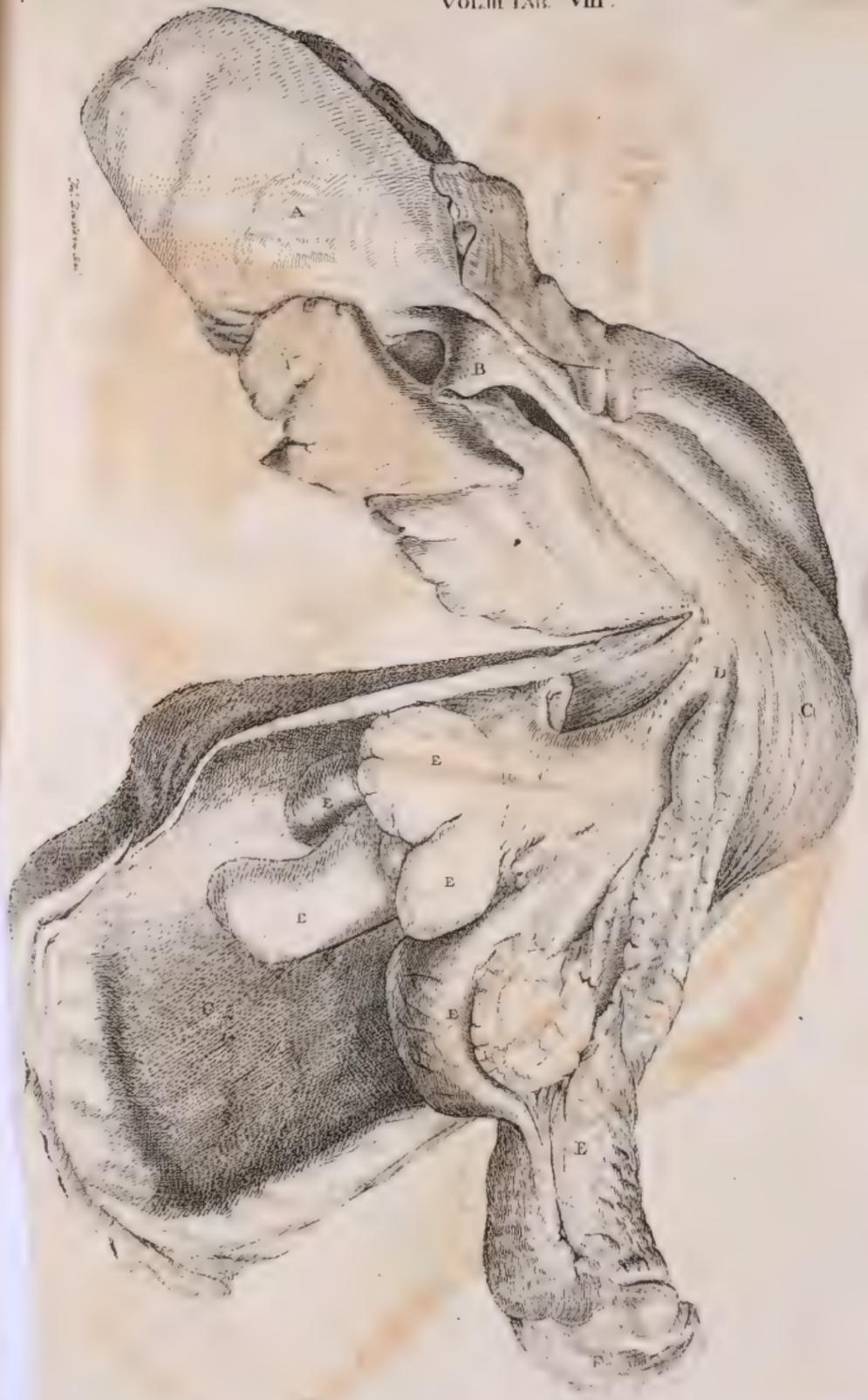
IT is probable that the increase of the polypus, during the two last years of the patient's life, had prevented its inversion and appearance in the mouth, and, at the same time, added much to the difficulty of swallowing.

ART.

p.

*[Faint, illegible text, possibly bleed-through from the reverse side of the page]*

Tab. Anatomica.



## ART. XXVIII.

PETRI CAMPER *Observationes circa Cal-  
lum Ossium Fractorum.*

**A**DMIRABILIS ea est Supremi Nu-  
minis in ossibus conglutinandis pro-  
videntia, ut, quum fracturis multifariis  
opportuna sint, ipsis facultatem sese resti-  
tuendi concefferit. Franguntur autem  
non omnem in directionem, uti veteribus  
maxime, et ex recentioribus plurimis,  
placuit, sed semper obliqua, vel in lon-  
gitudinem, ut ligna. Transversa fractu-  
ra seu raphanoides nunquam observata  
fuit, nisi patellam excipias, quae potius  
discrumpitur, quam frangitur. Forfan  
collisione, et instrumentis scindentibus,  
officula minora transverse dividi possunt;

verum agimus de fracturis in univ-  
 sum, atque in his pronunciamus semper  
 obliquitatem, vel fissuram, secundum  
 longitudinem locum habere.

NEQUE aliter contingere posse mani-  
 festum erit, si ad naturam rerum frangi-  
 bilium attendamus, quae omnes inflec-  
 tuntur, antequam fracturam subeunt:  
 Os femoris igitur, vel aliud quodcun-  
 que, multum inflecti haud poterit, nisi  
 prius exterior lamina rumpatur, mox  
 subsequens, tum tertia, et sic porro; quo-  
 niam vero centrum inflexionis hac ratio-  
 ne continue mutatur, necesse est, ut ob-  
 liqua seu dentata sit fracturae superficies.  
 Experientia quoque eam theoriam com-  
 probat; nunquam enim in ossium morbo-  
 forum thesauris transversas conspiciamus  
 fracturas, id est, tales quales veteres *ra-  
 phanoides* appellaverunt, et quas, absque  
 ullo examine, omnes chirurgiae scripto-  
 res, tanquam quotidie obvias, recensue-  
 runt.

SI vero contingat, ut os inaequabilis  
 et dentata superficie fere transversum  
 frangatur, non facile committuntur  
 frag-

fragmenta. Quamquam Celso placuerit, lib. 8. cap. 10. maxime tolerabilem esse simplicem eamque transversam fracturam: Capiti retuso quia inniti posse facilius caput superius ipsi videbatur. Pejores idcirco obliquas, et pessimas ubi fragmenta essent acuta, pronunciavit. Repugnat autem Celsi doctrina experientiae; obliquas enim facilius sanari videmus, transversas difficilius: Nunquam praeterea mihi videre licuit, quamquam perplures contemplatus sim, et in museo meo servem, fracturas, transversas dicendas, ita unitas, ut in directum essent sita fragmenta, sed semper ex adverso, quemadmodum alia occasione docebo. Statuendum proinde mihi videtur, maxime tolerabiles esse obliquas fracturas; pejores, ubi fragmenta valde acuta sunt; pessimas transversas.

FRANGITUR vero os plus vel minus obliquum, aliquando totum, aliquando pro parte; id est, frangitur pro dimidia parte, reliqua manente integra; estque ea magis frequens quam quidem vulgo creditur.

creditur. Id, si femori vel cruri contingat, tum insistere aeger potest pede affecto, veluti sano; et, nisi dolor et tumor adessent, nullum fracturae signum conjecturarem: Squamosas has ex similitudine appellandas esse, ex adjecta tab. 5. figura tertia, liquet.

VERUM, ne quae ab aliis fuse satis dicta fuerunt repeteremus; cum maxime examinanda esse censuimus, qua ratione ossa oblique fracta conglutinentur, et quid sit callus.

ANATOMICI, Calli genesin satis superque illustrarunt; esse, scilicet, gelatinam in initio, quae in cartilagineam primum, dein in solidam, mutatur compagem. Addo organicam, et reliquo ossi similem: Non enim, ferruminis instar, fractas superficies coadunat, sed unit perfecte, praetertim in valde obliquis fracturis. Ubi vero adversa inter se ossa confervent, callus non adeo regularem structuram ossis habet; haec autem, quia physiologos magis quam medicos spectant, transeo.

MAJORIS momenti est, ut investigate-  
mus, qua ratione ossa fracta coeant, et  
quid contingat interne; de qua re nemo,  
quod scio, huc usque cumulate egit.

EXHIBEO, ut perspicua magis sit ora-  
tio, tab. 5. fig. 1. os femoris, ex juniore ho-  
mine, oblique fractum, A, B, C. atque  
adeo bene coalitum, ut, nisi inaequabili-  
tas adesset, nemo divinasset, unquam se-  
paratum fuisse. Callus igitur, colore,  
substantia, et continuitate, ossis perfecte  
solidi et organici structuram acquisi-  
vit.

VERUM exhibeo etiam idem os secun-  
dum longitudinem ex industria sectum,  
ut, quid intus natura molita fuerit, con-  
spici posset; en, *primum*, canalis medulla-  
ris, C, D. separatus ab E, F, G; *secundo*,  
in K, et L, ac O, N. lamellae osseae a se  
invicem sejunctae, et auctae adeo, ut sep-  
tum obliquum formaverint cancellis va-  
riis scatens, maxime inter D, et E; *ter-  
tio*, en substantia ossea inter P, K, N. so-  
lida aucta. Fibrosa etiam compages, quae  
admirabile quoddam rete intra cavitatem  
E, G. mentitur, transversis fibris F et  
G.

G. ossis robur adauget. Similes enim in permultis fractis ossibus vidi.

EST autem adeo continua et unita calli ac ossis substantia, ut intus nullibi divisio, immo ejus ne quidem levissima appareat nota.

VIDETUR natura artificio prorsus admirabili lamellas osseas a se invicem separare, et quidem eo ordine, ut superiores deorsum, et inferiores fursum, cursum dirigant, donec se mutuo contingunt, et septum effingunt, quo mediae partis L, N. robur maximopere increfcit.

MIRATUS sum hanc naturae sollertiam prima vice in museo Clar. Hovii medici Amstelaedamensis, anno 1751, in unico osse; ex uno autem specimine nihil certi determinare ausus, incredibilique desiderio ardens, perplura ossa fracta juxta longitudinem secui, et constanter medullaris canalis divisionem ac septum osseum observavi. Dum altera vice, anno 1752, studiorum causa Londini degebam, Clarissimo Huntero meas monstravi circa morbofa ossa tabulas, meamque hanc  
circa

circa callum observationem, quae ipsi adeo arrisit, ut multa alia protinus divideremus secundum longitudinem, in quibus constanter eadem videre contigit.

NEQUE in ossibus femorum solis id locum habet, verum etiam in tibiis, ut altera figura ostendam.

Os tibiae dextrum, quod tab. 5. fig. 2. depinxi, similiter oblique fractum fuit ac prius, etiam optime coalitum, patet ex *a, b, c, d.* canalem medullarem septo *f, g.* in duos divisum, lamellas osseas prius separatas vicissim esse unitas, cancellis quam pluribus relictis, omnino ut in praecedenti figura.

TAB. 5. Tertia figura dextri lateris os tibiae propino, cujus pars anterior et media pro parte fracta squamam *A, B, C.* refert, ac in opposita *D, E.* septum, quod canalem medullarem penitus dividit in duos, quemadmodum in integre fractis.

TAB. 5. Quarto ulnam sinistram repraesentat, cujus pars anterior, tenuiorque, ex obliquo ad transversum accedente, fracta callum extrinsecus tumidiorem *A, B, C, D.* efformavit. Apparet autem et in  
hoc

offe septum D, C. et in callo inter C, B. et A, D. cancellorum copia.

HIS traditis, ad calli examen progredi licet, atque concludere duplici callo inter se uniri fracta: Externo, qui ex gelatina inter periosteum, et vasis seu fibris offeis exstillante, gradatim in os condensata fit, quemadmodum omnis ossificatio; et interno, seu lamellarum ossrearum internarum separatione atque elongatione, quemadmodum ex allatis exemplis evidens est.

QUID porro manifestius est, quam quod inde deducamus, fracta. postquam conferbuerunt, valentiora reddi? Quid contra absurdius, quam credere callum jam formatum, remediis externis, mercurialibus balneis vaporosis, vel aqua calida totum, dissolvi ac mollescere posse? Quid tandem ab ipsa natura magis alienum, quam remediis externis calli generationem adjuvare velle?

NEMO adeo insanus erit, confido, qui, his perspectis, remedia specifica, callum generantia, intus propinare, aut ex signis

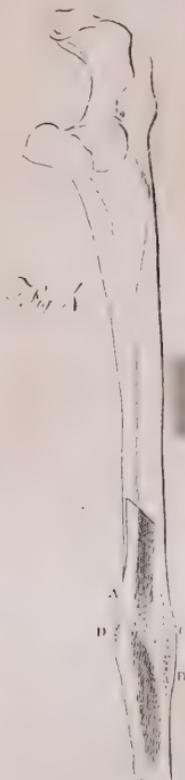
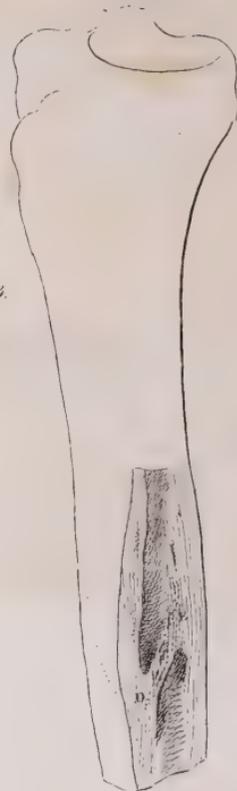
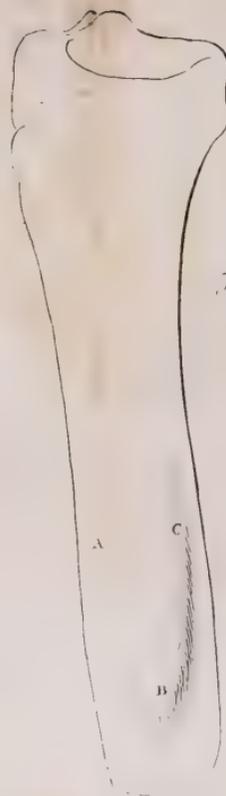
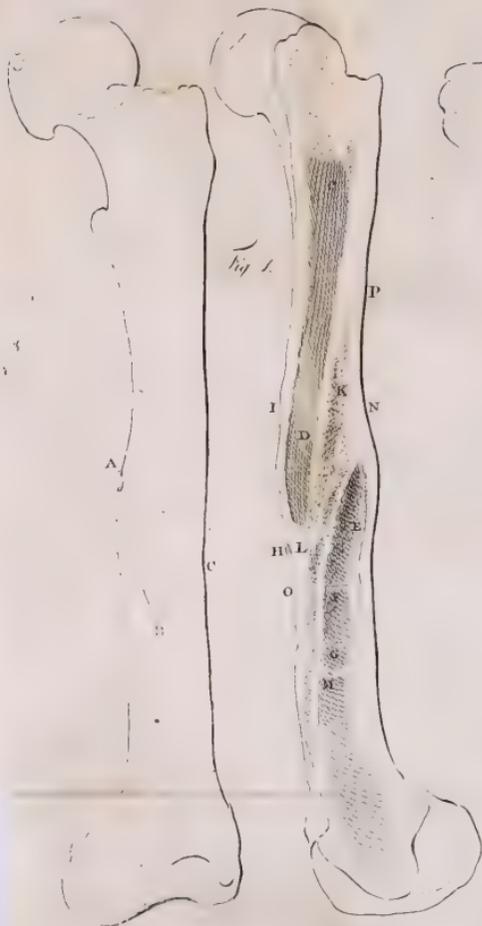
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ab auctoribus prolatis judicare, auſit, utrum jam factus ſit callus, nec ne?

PRÆTER ea, quorum icones mea manu factas hic fiſto, plura alia offa conſervo, quae eandem calli diſpoſitionem confirmant. Neque in hominibus ſolis, verum eadem in animantibus contingunt, et modo proſus ſimili; in gallinis, ſcilicet, et in anatibus, in quibus fracturae frequentiores ſunt, et quorum per multa offa, diverſis modis fracta, ac ſolo naturae molimine coalita, in muſeo meo conſervo.

DOCENT haec, et alia innumera humana offa fracta quae poſſideo, os ſemper cum offe vicino coaleſcere, ſive ejuſdem, ſive diverſi membri, ſint fragmenta. Docent inſuper, naturam ſolam formare callum, neque ullo artis egere auxilio.

Ex Praedio Lancumano,

1765.

VOL. III.

Z z z

ART.

## ART. XXIX.

*The History of two cases of Stones lodged partly in the Bladder, and partly in the Urethra, by Dr LIVINGSTON Physician at Aberdeen\*.*

A Pretty considerable and extensive practice in lithotomy has given me many opportunities of meeting with a great variety of human calculi. Such of them as were any ways remarkable or peculiar, either for their size, their figure, or substance, I commonly kept; and I have severals of them in my possession, which are very uncommon; at least, they appear so to me.

AMONGST these, I have taken the liberty to send you two, which are indeed  
very

\* Read 1765.

very similar to one another; only with this difference, that the one was taken from a living, the other from a dead subject. The stone marked No. 1. tab. 6. I extracted from a young man, a patient in our infirmary, about five years ago. He had been distressed with all the ordinary symptoms of a stone from his infancy; but, for two years before his admission into the hospital, he had been under the most racking pain, without any intervals of ease, attended with a constant *stiblicidium urinae*.

UPON founding him, I was soon convinced that the catheter touched a stone without its entering the bladder; and, upon pushing the catheter, I found a very firm and strong resistance, which made me give up any thoughts of passing the catheter into the cavity of the bladder. Upon introducing my finger *in ano*, I was not only sensible that a stone was lodged in the bulbous part of the urethra, but was likewise satisfied from the touch, that there was a stone, or some extraneous substance, within the sphincter.

er. The situation of the stone rendered the usual method of operating altogether impracticable, and determined me to cut upon the gripe ; upon laying hold of the stone with the forceps, and endeavouring to extract it in the ordinary manner, I found it was impossible to bring it away without either breaking the stone, or lacerating the parts ; and, upon feeling very carefully with my finger *in ano*, I suspected that the stone within the bladder was connected with that in the urethra, and that there was a necessity for enlarging the internal incision as far as prudence could permit. I then slid a narrow bistory along the side of the stone, till I had reason to think that the stricture was removed ; and, upon a second attempt with the forceps, the stone was easily extracted in the form you see it.

THE patient had a very favourable recovery ; and, what is most surprising, in the course of two months, the sphincter recovered its natural powers ; and he retained

retained and voided his urine without any pain or difficulty.

THE other stone marked No. 2. was extracted from a poor boy about 13 years of age, who was brought to the infirmary about two months ago, in order to undergo the operation; but, as he was extremely much emaciated, and his strength greatly exhausted, I thought he had no chance for recovery, and declined giving him any pain or trouble.

HE accordingly languished in great misery, for ten or twelve days after his admission, and then died.

HE had likewise been distressed with all the ordinary symptoms of a stone from his infancy; but, for two years before his death, had been under constant unremitting agony, and had a perpetual *stillicidium urinae*, as the other patient above mentioned.

UPON opening his body, the bladder was greatly contracted, its coats much thickened and indurated; the ureters very much enlarged; the kidneys in the same state; and a large purulent collection

tion in the pelvis of each. In order to give you the better idea of the situation of the stones, I have attempted to delineate their figures.

*Explanation of Table 6.*

TAB. 6. fig. 1. *a. a. a* That part of the stone which was lodged without the sphincter in the urethra.

*b. b* A deep nitch into which the sphincter and neck of the bladder was very closely engaged.

*c. c. c.* That part of the stone which was lodged in the cavity of the bladder.

As the figure and shape of the stones are pretty similar, the above explanation may serve for No. 2.

Charlestown in South Carolina, in the  
first volume of *Medical Observations and*  
*Inquiries,*



## ART. XXX.

*Of the Use of Mercury in Convulsive Disorders, by Dr DONALD MONRO, Physician to St George's Hospital, London.*

THE convulsive disorders called *opisthotonus* and *tetanus*, which come after lying in the fields, or being exposed to alternate heat, cold, and moisture, and other such causes, are very common in the West Indies, and other hot climates; and are sometimes, though but very rarely, observed in Great Britain.

THEY are mentioned by Hippocrates, Celsus, and other antient authors; but the best account we have of them is that published by Dr Lionel Chalmers of Charlestown in South Carolina, in the first volume of *Medical Observations and Inquiries*,

*Inquiries, by a Society of Physicians in London*, where the Doctor, after giving a very accurate history of the symptoms and causes of these diseases, observes, that few recover in comparison of the number they attack; and that warm baths and opiates are principally to be depended upon for a cure; which agrees with the practice used in the few cases of the locked jaw, which have been successfully treated in this country.

MOST late practitioners look upon these disorders as very fatal. The gentleman, who was physician to the naval hospital at Gibraltar during the late war, told me, that he had had above forty people under his care for the tetanus, attended with the locked jaw, who all died, except one, notwithstanding he had used evacuations, baths, and fomentations, and had given very freely of opiates, and all other medicines that he had ever heard recommended in such cases. The disorder in the one who recovered was occasioned by a hurt of a finger; and the  
 amputation

amputation of that member on the first appearance of the locked jaw proved the cure.

As the remedies hitherto recommended for the cure of these convulsive disorders have proved so ineffectual, the following account of a successful method of cure by mercurial unctions, communicated to me by a gentleman who was formerly a practitioner in physic in the island of Jamaica, and who has allowed me to transmit it to your society, cannot fail to be acceptable.

WHILE this gentleman practised in Jamaica, he had a great number of cases of the tetanus, attended with the locked jaw, under his care. At first, he used to give very freely of opium, musk, and other medicines of this class; to bleed, and make other evacuations, while he used baths, fomentations, embrocations, and other external applications, but all without the least success; and, as he had lost a great many patients without being so lucky as to make one cure, he began to believe that this disorder always pro-

ved fatal, and was not to be cured by medicine, notwithstanding what some practitioners had alledged. However, having received an unexpected hint concerning the good effects of the mercurial ointment in such cases, he resolved to try it; and ordered the first patient that offered, to be put into a warm room, and to be rubbed two or three times a-day with the ointment, till such time as a salivation was raised, when he, with pleasure, observed, that as soon as the mercury began to affect the mouth, the convulsions of the muscles of the jaws, as well as all the other spasms and convulsions, ceased, and the patient was freed of all his complaints.

AFTER this, he treated every case of this kind which came under his care in the same manner, and cured twelve, which were all who applied to him for advice so early in the disorder, that there was time to bring the mercury to the mouth before the fatal period was expected. A few died in whom the disease was so far advanced before he saw them, that

that there was not time to raise a salivation. None of the cases which were under this gentleman's care in the West Indies were the consequences of wounds or capital operations; nor has he had any opportunity of trying it since in cases of the locked jaw, which sometimes follow capital operations, owing to his having given over practice; but he thinks, that, from the similarity of the complaint, there is no doubt but that the mercurial frictions would be equally efficacious in such cases, as when the disorder comes from catching cold, or other such causes.

HE thinks, that the best method of raising a salivation in these disorders is to put the patient into a room made as hot, by means of a fire, and being surrounded with blankets, as the patient can bear; and to rub in a mercurial ointment, made with equal parts of quicksilver and hogs lard, as freely and as frequently as can be done with safety. That the sooner the cure is begun after the first appearance of the locked jaw, the better. And that, in cases far advanced, the mercury

cury must be thrown in as fast as possible.

THIS gentleman used no preparation before he began the use of the ointment, but set his patients to work as soon as possible. He now and then gave strong opiates to procure rest, both before and after the spitting came on; but he observes, that the quantity of opium, and the frequency of the repetition of its dose, must be determined by the state of the patient, and the symptoms which occur. Since his return to England, he has had one case of the same kind under his care, which was cured by the method here recommended.

Jermyn-street, London, Jan. 29.

1 7 6 6.

ART.

## ART. XXXI.

*An additional Case in proof of the Usefulness of Mercury in convulsive Disorders, by ALEXANDER MONRO, M. D. and Professor of Physic and of Anatomy at Edinburgh.*

**J**AMES TOD farmer near Linton, a stout healthy man, twenty-two years of age, on the first day of January 1769, had the misfortune of fracturing his leg, and of wounding the teguments at the place of the fracture.

THE case was treated very carefully and skillfully by Mr John Hall surgeon at Linton; and, within six weeks, the wound was almost healed, and the fractured bones were so well reunited, that the patient  
ventured

ventured to walk with the assistance of stilts.

ON February 27th, he was seized with a tremor of his whole body, attended with frequent yawning, and a quick and full, but intermitting pulse.

ON March 1st, his jaws felt stiff, and, a few hours after that, were locked so fast together, that he could not separate his fore teeth above one eighth of an inch from each other; and his lips were drawn close to his teeth.

He, at the same time, complained of great pain in his neck and back, and around the lower part of his chest; and sweated profusely, without relief.

ON March 2d, his head was drawn back with great force, and the muscles of the whole trunk of his body became rigid. His legs and arms were likewise affected in a similar way; but in a less violent degree. Besides a general rigidity of the muscles, he was greatly distressed with frequent and very painful startings of them.

THESE

THESE symptoms continued rather increasing than abating till March 11th; yet he was quite sensible during that whole time, and had even some appetite for food.

IN the mean time, Mr Hall and Mr Reid surgeon at Peebles, who had likewise been called to him, had bled him twice; had purged and blistered him several times; had thrown in glysters occasionally; had used the pediluvium; and, after it, applied anodyne cataplasms to his soles; and had given him musk and opium in considerable quantity, to wit, of the former, ten grains, and of the latter two grains, twice or thrice a-day at first; but, for several days past, that quantity had been taken every fourth hour.

DR CULLEN and I were now (March 11th) consulted about him, by letters from Mr Hall and Mr Reid.

THE cause of his symptoms seemed very uncertain to us; for, although we suspected, as Mr Hall and Mr Reid had done, that these chiefly or entirely proceeded

ceeded from the puncture, tension, or irritation of some nerve, by the splinters, callus, or sharp matter collected near the fracture; especially that, from the restlessness of the patient, and his having used his leg too soon; it was found to be bent a little at the place of the fracture, and that the tetanus seemed most violent on the same side with it; yet the patient did not complain of particular pain in that part; and no redness, swelling, or collection of matter, then or since that time, appeared there\*.

UPON the whole, the general method of cure attempted by Mr Hall and Mr Reid, appeared to us very proper.

WE therefore desired, that, after repeating the bleeding, that method should be

\* Mr Hall, on recollection, thinks it material to observe, that the patient had been married about a month only before he fractured his leg; and that possibly he brought on the disease, or rendered himself more liable to it, by indulging venereal inclinations too soon after that accident.

be prosecuted; but that the quantity of the musk and opium, especially of the latter, should be gradually increased as far as could be done with safety: And, besides venesection and a general warm bath, we advised that the fractured leg should be bled with leeches and carefully fomented. In case the symptoms should not soon yield to these, we farther proposed, that, even although no collection of matter or carious piece of bone could be discovered, an incision should be made at the fractured place, as the discharge of blood from the part and succeeding suppuration might, we thought, lessen the sensibility of the affected nerves.

AFTER nine days farther trial of the above, without benefit, excepting only that he would not submit to the incision, I ventured, in Dr Cullen's absence from town, to propose mercury, as directed in the last article XXX. by my brother; but advised, that the opium should be continued with it. The effect of this

I cannot better explain than by the following letter to me from Mr Hall.

“ Sir, James Tod continued as I described in my last, till your letter came concerning the mercury.

“ Immediately we set about giving it a trial, and accordingly rubbed on two drams of quicksilver, intimately killed with axunge, the first night; and next morning the same quantity: Next night and morning again, the same quantity; and so on, till we had rubbed in twenty drams of quicksilver. We confined the unction principally to his legs, from a supposition of the cause lying there. All the while, the salivation was never brisk: He only felt a little foreness in his mouth, and spit a little more than when in health. It operated, however, sensibly by urine, and by sweat; and never went off by stool. Besides the quantity of mercury above mentioned, another half ounce was rubbed in at twice, with two days interval between the times; and two days after he had finished the former quantity.

“ The

“ The second day after beginning the  
 “ unction, there appeared a very sensible  
 “ abatement of all the symptoms. All  
 “ the cramps, convulsive spasms, and  
 “ racking pains gradually ceased; and,  
 “ by the sixth or seventh day from be-  
 “ ginning the mercury, he was very near  
 “ intirely free of the stiffness and rigi-  
 “ dity which had been universal over his  
 “ whole body. He began, by degrees, to  
 “ get his jaws opened wider and wider, and  
 “ to move all the members of his body,  
 “ though extremely debilitated, by the  
 “ strong, continual, and lasting convul-  
 “ sions with which they had been seized.  
 “ He began too, by degrees, to recover his  
 “ appetite, and wanted to get out of bed  
 “ sooner than we thought safe, from the  
 “ previous use of the mercury. He got  
 “ several laxative ptisans to carry off the  
 “ mercury, and continues still entirely free  
 “ from any complaints.

I am, &c.

JOHN HALL.”

Linton, June 1.

1760.

*End of Volume Third.*



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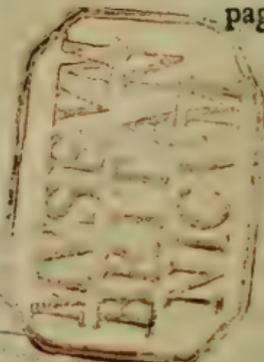
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