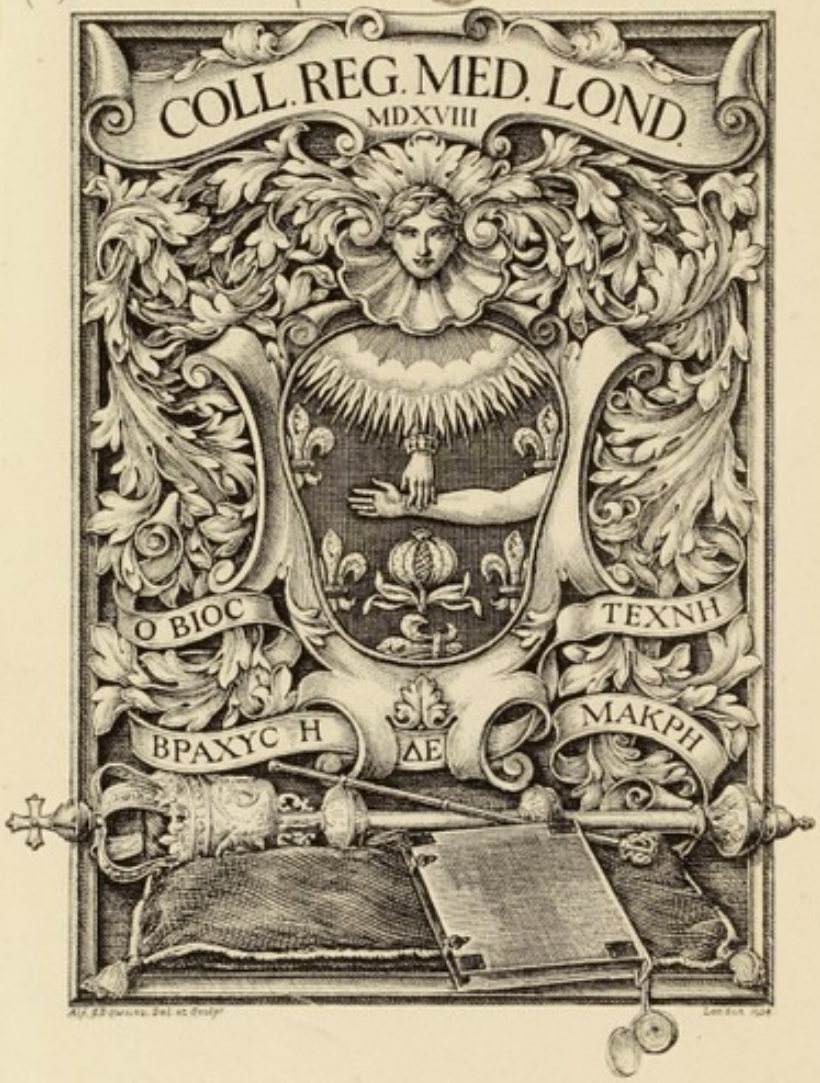

From the Author

REFLECTIONS

ON

FEVER:

INTENDED

TO POINT OUT THE PRINCIPLES

UPON WHICH A

Systematic and Useful Method of Treatment

MIGHT BE ESTABLISHED.

BY

ROBERT CALVERT, M. D.

OF THE COLLEGE OF PHYSICIANS, LONDON;

PHYSICIAN TO THE FORCES,

&c. &c. &c.

" What the real derangement in the system is, which produces the external appearances in Fever, is not at all known; it is a disease, the essence of hich is not understood."—FORDYCE.

London:

PRINTED FOR J. CALLOW, MEDICAL BOOKSELLER,

10, CROWN COURT, PRINCES STREET, SOHO;

By Smith and Davy, Queen Street, Seven Dials.

1815.

TO THE

Medical Officers

OF

THE BRITISH ARMY,

THE FOLLOWING

REFLECTIONS

ARE

MOST RESPECTFULLY DEDICATED,

BY

THE AUTHOR.

ERRATA.

Page 5,	line 20,	*for* emanentur,	*read* emarrentur.
18,	12,	sixth,	fourth.
24,	6,	experience,	experiences.
28,	15,	enaximum,	maximum.
31,	8,	exerciting,	excreting.
49,	19,	opthalmia,	opbthalmia.

REFLECTIONS

ON

FEVER,

&c. &c. &c.

CHAP. I.

1. OUR knowledge of the nature of Fever is still very imperfect, as may be seen both by the contradictory doctrines of different writers, and by the diversity of treatment pursued by different practitioners. For want of a clear and perfect theory of the disease, and having no fixed principles to keep them in check, practitioners frequently fly into the most opposite extremes, and commit the most flagrant excesses, without even the fear of contradiction or censure. This want of regularity and system, in the treatment of so important a disease, is greatly

to be lamented in a scientific point of view; but how much more is it to be lamented on the score of humanity?

2. The way in which medical practice in Fevers is outstriding all theory, and surpassing, in boldness, every thing we have heard of in former times, is enough to awaken, in the most unphilosophic mind, a spirit of curiosity as to the real nature of these affections. Galen was thought by many to have carried blood-letting to a very imprudent length, when he boasted of having taken three pounds of blood from the steward of a Roman nobleman. And only ten years ago I heard the Professor of the Practice of Physic at Edinburgh mention, as an extraordinary instance of blood-letting in Pneumonia, that one of his patients lost 120 ounces in three weeks; and that he himself, on one occasion, took thirty ounces at one bleeding! Since that period, however, blood-letting has been carried to such lengths, that we now hear of fifteen pounds being taken as nothing extraor-

dinary. (Burnett on the Mediterranean Fever, p. 182.) I have seen cases of ophthalmia where 160 or 170 ounces were said to have been taken (unsuccessfully however) in the space of three days; and I have been told, by other practitioners, that they have been in the habit of drawing 70 or 80 ounces at one bleeding.

3. The reasons usually given for the necessity of such evacuations of the vital fluid, are by no means satisfactory and adequate to warrant such practice. If the abstraction of pounds after pounds be necessary to remove the symptoms of fever, surely we ought to find other reasons to account for them than *insolation, excitement of the system, vascular action, or energy of the brain.*

4. It is a singular and paradoxical fact, that the disease has never been accurately defined, while the greatest novice in medicine can easily recognize its presence. This certainly argues either a very imperfect knowledge of the nature of the dis-

ease, or a most woeful defect in language, it being inadequate to represent to others what we ourselves comprehend.

5. Ingenious theorists have contributed not a little to render language still more defective, by the employment of general terms, that serve, like the materials of a romance, to make an interesting story, though they are perfectly unconnected with nature and truth. Debility is a vague and general term, to which the most opposite states of the body are referred: and action is made to express the reverse. If therefore we wish to counteract either the one or other of these states, we have nothing more to do than call to our aid their opposing agents, which we find under the general terms, stimulants and sedatives. As almost every morbid appearance of the body is referred to one or other of these terms; and as every curative agent is classed either as a stimulant or a sedative, it appears very easy as well to understand the phenomena of diseases as to remove them. Instead of

distinguishing each particular phenomenon by applying to it a discriminating term, we fix a meaning to the term first, and apply the phenomena to it afterwards.

> " As if rules were not in the schools
> " Deriv'd from truth, but truth from rules."
>
> HUDIBRAS.

6. Language, though certainly defective, is, I believe, not more so than our usual mode of investigating and describing diseases. Instead of patiently examining into their nature and essence by legitimate and inductive reasoning, we content ourselves with describing the casual symptoms, because these, perhaps, happen to be the most striking to our senses: " expedit autum, ut, in describendo aliquo morbo, peculiaria et perpetua phenomina seorsim ab accidentalibus et adventitiis emanentur." (Syd. op. prefacio.) In defining the malady of a sinking ship, no one would notice her signals of distress, as the report of her guns, her reeling and gradual subsiding

in the water, and lastly, her fatal plunge into the fathomless abyss. He would describe in plain and simple language the hole in her bottom. In human maladies, however, we seem to prefer the pathetic and highly coloured description, though no inference whatever can be drawn from it, to the plain matter of fact. Thus, the gesticulations of a cataleptic patient, or the incoherent ravings of a delirious man, are attended to with much greater interest than the true physiological state of the system.

7. The pulse is one of those indices in fever that never goes unnoticed, although very few, if any, understand the laws by which it is governed. What inference can any one draw from feeling the pulse, who is both ignorant of its laws, and of the nature of the disorder of which it is supposed to be the index? or what knowledge can we obtain from being told, that the pulse is *slow, quick, soft, hard, regular, irregular, running, intermitting, feeble, full, sinking, getting up, rising,*

falling, frequent, jerking, small, wiry, strong, weak, languid, vibrating, &c.? During the progress of a febrile paroxysm, Dr. Cullen says, in the cold stage it is *sometimes slower but always weaker than before*: it then becomes *smaller, very frequent,* and *often irregular:* afterwards it becomes *more regular, hard,* and *full:* then it becomes *softer* and *less frequent;* and finally, *it returns to its usual state.* (First Lines, ch. i. 12.) Another author however says, "Pulsus (febriculorum) sanorum pulsui non admodum absimilis." (Sydenham Op. 505. 519.) Dr. Irvine found the pulse, skin and bowels natural; and in another instance of fever he found it beating only forty-two in a minute. (Some Observations on the Diseases of Sicily, &c. p. 13. 64.) In some bad cases of plague too, Russell found the pulse not much different from the natural state. (Russell on the Plague, p. 86, 87, also in Cases, No. xii. xxvi.) These examples, I think, are sufficient to prove that no useful inference whatever can, in general,

be drawn from this adventitious and unsteady symptom.

8. There appears to be another important error which many medical and philosophical writers have not yet overcome; and that is an ambiguous mode of considering *causes*, and their inseparable companions, *effects*. Nothing, perhaps, since the invention of language, has given rise to greater controversy than these vague and unsettled terms. The great Dr. Cullen says, " As the hot stage of fever is so constantly preceded by the cold, we presume that the latter is the *cause* of the former, and therefore, that the cold stage is the cause of all that follows in the course of the paroxysm." (First Lines, ch. ii. 34.) By a parity of reasoning it might be said, " As the summer is so constantly preceded by the spring, we presume that the latter is the cause of the former; and therefore, that the spring is the cause of all that follows in the course of the year!"

9. It is to be recollected, that the whole phenomena of nature consist of a series of changes, or successive events; and that it is solely from our observing these changes that we derive the notion of time, for

> " Tempus item per se non est, sed rebus ab ipsis
> Consequitur sensus transactum quid sit in ævo,
> Tum quæ res instet; quid porro deinde sequatur:
> Nec per se quenquam tempus sentire fatendu 'st
> Semotum ab rerum motu, placidaque quiete."
>
> LUCRETIUS.

10. If we carefully attend to the phenomena of nature, we shall find that every species of matter is possessed of certain characteristic qualities by which we recognize it; that such matter can suffer no change in its qualities *per se*; but that, to the production of change, which we may denominate an effect or event, a combination with other matters, or qualities of matter, must necessarily take place. These combinations, however, in their nature, depend entirely upon the presence of the agents concerned, or, at least,

the presence of their qualities. In order to produce the effect of generation, either in the animal or vegetable kingdom, a combination or union of the sexes is required. The effect of crystallization is produced by the combination of the particles of minerals. Preception is the effect of combination between the percipient organ and the object perceived. Magnetic attraction is the effect of the combined qualities of the iron and the loadstone.

11. All these effects, however, take place independent of succession; the causes acting simultaneously with the effect, and with each other. The male and female do not precede each other in the act of generation; neither does the effect take place posterior to the act: in like manner, during crystallization, one particle does not act before the other, nor is the crystal formed after the union of the particles; but at one and the same time. The same law may be observed in every other physical effect in nature.

12. It is also further to be remarked, that in the production of any physical effect, the influence of both and every agent concerned is equal in power—"actus enim illi, cujus est actus inest. nec tamen actus moventis diversus est ab actu mobilis, sed unus utriusque et agentis et patientis actus, &c." (Sennertius Epit. Phys. lib. 1. cap. ix.) The female influence is equally active and powerful with that of the male: light and the eye are equally powerful and essential in producing the effect of vision; and the loadstone has not more influence upon the iron than the iron has upon the loadstone; and so of the rest. Every effect in nature, then, consists of a mutual and simultaneous combination of matter, or the qualities of matter.

13. Sometimes it happens that events succeed each other so rapidly, from the agents being at hand, that a number of successive events are considered as one continued effect. If a stream of water, for example, falls rapidly into a vessel,

the stream is said to fill the vessel, or cause the effect of fulness; but it is to be considered, that fulness does not happen till the end of the operation; and that any interruption, during the course of it, would leave the effect in a state agreeing exactly with the quantity that had fallen *at the time* of the interruption. To render the matter still clearer, we may separate these events to a greater distance from each other, by allowing the water to fall drop by drop. Here, the first drop falling into the vessel (the vessel, however being as necessary as the drop) produces the effect of a drop being contained; the second drop falling, that of two, and and so on till the vessel will contain no more; and it is the last drop that falls, previous to its running over, in conjunction with all the preceding ones, and with the vessel itself, that causes the effect of plenitude. The effect of sound, and probably that of vision, is produced in the same way. A certain concussion of the air at a distance from the ear, produced by a combination or violent contact be-

tween this and a less elastic body, communicates, by combination, a similar, though proportionally fainter, concussion to the next adjoining particles of air. These, by the same law, communicate the concussion to the next, and so on, till, at length, the particles next the ear become affected by their combination with the next distant; and they, combining with the ear, produce the effect of sound. It is not the original concussion, therefore, that we hear: it is the last of the innumerable effects that have happened with almost inconceivable rapidity. These succeeding effects, however, are not necessarily connected, but depend upon the combinations met with at each succeeding step: it is the universal presence of the particles of the air that renders this train of events so regular and expected. If they were withdrawn or separated by an intervening medium, that would not form similar combinations, the succession would then be interrupted, and sound would not follow. " It seems now, (indeed,) pretty generally agreed among phi-

losophers, that there is no instance in which we are able to perceive a necessary connexion between two successive events, or to comprehend in what manner the one proceeds from the other as its cause." (Stewart's Philosophy of the Human Mind, sect. ii. p. 71.) Events may succeed each other very constantly, yet the one cannot be said to be the cause of the other: death, for example, pretty constantly follows the living state, but no one would be absurd enough to say that life was the cause of death.

14. In common language, however, causation and succession have been so long confounded, that we have not as yet appropriate terms to distinguish them; but as it would be the height of presumption in me to attempt to make a reform in language, though, at the same time, as it is of the utmost consequence that an author should make *his* language as clear and intelligible to his readers as possible, I shall satisfy myself with stating, that the terms made use of in the

following sheets, denoting causation, in their common acceptation, frequently signify nothing more than succession, in the way I have just endeavoured to explain it; and whenever they are intended to express causation, the several causes, with their effects, are to be considered as simultaneous and equipotent. The reader, I trust, will be able to distinguish whenever the one sense and the other is signified.

CHAP. II.

1. In applying the above doctrine of causation to the phenomena of febrile diseases, it will hereafter be found, that Fever does not consist of a single effect, but of a train of successive events or effects, from its commencement to its termination, whether in health or in death: but, before I can explain the nature of these events, it is necessary to premise certain laws that belong to the animal economy.

2. It is well known to anatomists and physiologists, that the vascular system is susceptible of various degrees of relaxation and distention; for, after death, several pounds of melted wax may be thrown into it, in addition to its ordinary contents, without lacerating the vessels; but it is probable that so great a quantity, even of natural fluids, could not be added during life, while the muscular

coats of the vessels retain their contractile power.

3. To what degree the vascular system may be distended during life, without inconvenience, is not very easy to ascertain; but it is probable, that some subjects would bear more than others, according to age, sex, and various other circumstances.

4. The total quantity of red blood contained in the human subject, was estimated by Haller at about twenty-eight pounds:* (First Lines of Philosophy, chap. vi. cxlix.) If, in addition to this, we allow two pounds for the colourless fluids, the whole of the circulating mass would amount to about thirty pounds.

5. During life and health, there is a constant percolation of fluids into and

* Exactness in this and the following estimates is not necessary.

from this common mass, the ingress passing through the thoracic duct, and the egress through the various excreting or secreting organs; as the skin, the lungs, the kidneys, the liver, the pancreas, the lachrymal glands, the salivary glands, &c. The total amount of this percolation varies according to the climate, time of the year, exercise taken, and other circumstances; sometimes, however, it amounts to nearly eight pounds *per diem*, or about one sixth part of the whole circulating mass (Sanctorius). In order to preserve the standard quantity of fluids in the system uniformly the same, the ingress and egress must be equal in quantity; i. e. the sum total of the excretions must, in a given time, be exactly equal to the quantity of chyle taken up from the intestines, and conveyed through the thoracic duct into the mass of blood. This equilibrium between the ingress and egress of the circulating fluids I shall call the *balance of circulation*.

6. Sanctorius, and his commentator, Gorter, considered the balance between the ingesta and egesta of the whole of the animal juices as the standard of health (Gorter, de Perspirat. Insensib. cap. i. iii.); but as the excrements do not enter into the circulating mass, they being merely to the animal what soil is to the plant, I exclude the contents of the intestines wholly from the system I am about to consider.

7. It is evident, that the balance of circulation may be lost in two different ways, viz. on the side of depletion, when the egress exceeds the ingress; or it may be lost on the side of fulness or plethora, when the ingress of fluids exceeds the egress.

8. Depletion, again, may be occasioned by preternaturally diminished ingress of chyle; by preternaturally increased egress of excretions; by both conjoined.

9. Fulness or plethora, on the other

hand, may arise from preternaturally increased ingress of chyle; from preternaturally diminished egress of excretions; from both conjoined. I shall take examples of each of these peculiar states of the vascular system, in order to ascertain which of them, if any, belong to a febrile state of the body.

10. Depletion, arising from diminished ingress, takes place in obstructions of the thoracic duct, impeding the flow of chyle. It happens in those who abstain from food and drink. Depletion occurs from excessive egress in diabetic patients—in excessive lactation—during the menstrual period—and from all natural and artificial hæmorrhages. Depletion, again, occurs from diminished ingress and increased egress conjoined; in jockeys, who rigidly abstain from drinking, while they create a copious flow of perspiration by means of exercise and external heat. In none of these examples, however, do we find that particular train of symptoms we call fever.

11. As the process of absorption from the intestines is concealed from our view, it is difficult to *prove* that this is, at any time, carried to excess. It is extremely probable, however, that this happens during a constipated state of the bowels, while much is drank, and while there is no corresponding increase of excretions. This state of the body, every one knows, is a common attendant on fever. "Si vero cibi maneant in ventriculo ampliore tempore quam opportunum est, et alii ad ipsos incidant corpus utique repleatur: et, dum *premuntur a plenitudine venæ, calor* ac *dolor* corpori accesserint, æstate quidem citius, hyeme vero posterius." (Hipp. de Morbis, lib. vi. 17.)

12. The next example that presents itself is, when fulness of the vascular system arises from diminished excretions; and I shall go no farther than Dr. Cullen's First Lines (part 40), to prove that this very frequently happens in fever.—"It is to be particularly observed (says he), that during the cold stage of fever,

there seems to be a spasm induced every where on the extremities of the arteries, and more especially of those upon the surface of the body. *This appears from the suppression of all excretions, &c.*

13. Lastly, we shall have plethora arising from excessive ingress and diminished egress combined in all those fevers attended with costiveness, excessive thirst, and diminished excretions. From the whole of these examples, I think, we may fairly infer, that fever consists in the balance of circulation being lost on the side of fulness or plethora.

14. The balance, however, may be lost in this way to a certain extent, without occasioning inconvenience, owing to the elasticity of the vessels. This indeed must happen more or less in every case of fever, previous to the declaration of the symptoms. Or, should events occur in time to interrupt the accumulation, and restore the balance, the perceptible symptoms of fever may never occur at

all. This state of the vascular system, however, in my opinion, ought to be considered as latent fever, the repeated attacks of which might explain the consequences we frequently observe in those people who have lived long in unhealthy situations, although they themselves have never been conscious of an attack. The repeated influx of fluids to the internal parts distends the vessels of those parts, and gives rise to those subsequent enlargements of the liver, and spleen in particular, that are so common in those situations. The symptoms of fever then are mere indices of the extent to which the balance of circulation has been lost.

15. According to the estimate of Lavoisier and Seguin, the daily amount of insensible perspiration, under ordinary circumstances, is about one pound fourteen ounces (Memoires de l'Acad. des Sciences, 1790). Now, supposing this to be suppressed for the space of four and twenty hours, the other functions remaining unchanged, it is evident, that no less

than thirty ounces would be added to the circulating mass during that space of time, which is at the rate of ten drams *per horam*.* When we reflect upon the alleviation of the symptoms, which a patient experience in the height of a febrile paroxysm, from the abstraction of a few ounces of blood, or from the loss of a like quantity by perspiration, we cannot wonder, that the accumulation of the perspirable fluid alone should, in the space of twenty-four hours, give rise to all those distressing symptoms we perceive to happen.

16. The quantity of the pulmonary excretion was found, by the same philosophers, to amount to about fifteen ounces in the above space of time. Should this alone, therefore, be suppressed, the plethora would soon be considerable. But

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* Might not the subject of these important physiological facts, as relating to fever, have been that which Lavoisier wished to develope before his execution?

were it suppressed in addition to the perspiration, the increase of fluids in the vascular system would be forty-five ounces *per diem*. Considering the quantity of the pulmonary exhalation, and the importance of the organ from which it proceeds, it is rather extraordinary that so little attention has been paid to it by writers on fever, and on pneumonia in particular. Its paucity might, though not with accuracy, be easily ascertained by placing a mirror or other polished surface near the mouth. Hippocrates frequently mentions the breath being hot but never dry.

17. The daily amount of urine, according to the experiments of Sanctorius and Gorter, was found to be from thirty to forty ounces. When this is suppressed, says Haller (Physiology),—" It produces sharp fevers;" and Gorter observes, " Urina parcior procedens omnes sortitur effectus, qui in aliis minutis evacuationibus conspicuuntur. Singulare habet,—1. Quod circa locum et vesicæ gravidita-

tem et ardorem excitet. 2. Suos singulares effectus, ex materia urinosa exhibeat, ut torporem, soporem, tremorem, convulsionem, apoplexiam, stuporem, rigorem, patalysin, febrem, &c." But it is to be recollected, that a temporary accumulation in the bladder, and a want of secretion, are two very different diseases. The latter obtains in fever.

18. From the comparatively small quantity of bile that is usually secreted from the circulating fluids, the suppression of it alone, although it destroys the balance of circulation in proportion to its quantity, produces a more tardy accumulation than that of any of the preceding ones. However, as it proves equally fatal with the rest, unless the secretion is restored in due quantity, it is equally to be considered and attended to. From what I have said respecting this secretion, it will be seen that I consider simple jaundice as a slow fever. The other excretions are so small in quantity that I shall not notice them in this place.

19. The above estimates of the quantities of the different excreted fluids, and of the perspiration in particular, are moderate, the experiments, of which they are the result, having been made in temperate climates, and under ordinary circumstances.* But in warmer climates, where the perspiration is almost always sensible, its suppression would, of course, cause a much more rapid accumulation. At Venice, where Sanctorius found the daily excretions (excluding excrement, which he found to be about four ounces), to be ninety-two ounces; the greatest portion of which passed off by the skin, lungs and kidneys; their total suppression would cause vascular accumulation, at the rate of nearly four ounces every hour, or ninety-two ounces daily. If, however, inordinate thirst be gratified at the same time, it may go on even still more rapidly. Are not these circumstan-

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* The estimates made by the French philosophers, were the mean quantities taken from a number of experiments.

ces sufficient to account for the rapid progress of fevers in warm climates?

20. In an extra-tropical situation, two important changes take place in the vascular system annually, viz. there is a gradual flow from the skin to the kidneys, from the summer to the winter solstice, while there is an equal reflux from the winter to the summer solstice (Richerand's Elements of Physiology, p. 170). The same phenomena must also happen in passing from one climate to another; and as the standard quantity of fluids, percolating through the body, is at its enaximum in warm climates, and in the summer season; so we find the frequency and danger of febrile complaints in them proportionally increased.

CHAP. III.

1. I shall next attempt to explain more particularly the effects of diurnal changes of temperature upon the vascular system, as tending to produce a febrile state of the body. It is to be remarked, that a regular and alternate rise and fall of temperature commonly takes place every four and twenty-hours, according to the absence and presence of the sun, the fountain of heat; consequently, those who are exposed continually to the temperature of the atmosphere, suffer a diurnal flux and reflux in the vascular system. During the day, the pores of the skin are open; but, during the night, they become closed, when a vascular plethora takes place: that in warm latitudes this change takes place more suddenly than in cool ones, from the more sudden rising and setting of the sun: that in damp situations, where, from the shallowness and

opacity of the water, the rays of the sun are obstructed so as to cause rapid evaporation from the surface, the atmosphere, while the sun is up, dissolves a very great quantity of water, with which it becomes saturated; but, the moment the sun goes down, the atmosphere, being no longer able to hold so great a quantity of water in solution, lets go part of it, which we see in the form of fog. The atmosphere now, to use the language of chemistry, becoming a much better conductor of caloric than before, strikes a chilliness into the human frame, shuts up the pores, and stops the flow of perspiration. As the intestinal absorption is not so immediately under the influence of the air, it probably continues, so that the fluids begin to accumulate from this moment. If the person is comfortably lodged, and enjoys repose, the perspiration may be restored during the night, so as to prevent any considerable mischief. Or, even if the person be exposed to the night air, the accumulation may go on till morning, when the returning warmth of the sun may restore

the equilibrium, or, at least, restore the fluids to their natural quantity, without the previous accumulation being perceived.

2. But, should any accidental circumstance occur in the morning to prevent the return of perspiration; and if, at the same time, the other exerciting organs obstinately refuse to transmit the superabundant fluids, the inconvenience is soon perceived. A lassitude and drowsiness come on, to which is soon added an aching pain in the head, back and limbs, along the course of the large vessels, but usually referred to the bones. These symptoms increase, till, at length, the muscular coats of the vessels are overpowered by the increasing pressure; and it seems to be during this struggle between the vessels and their distending load, that we see those violent convulsions of the frame called shivering.

3. The period at which the vascular distention arrives at this pitch, depends,

of course, upon the rapidity of the previous accumulation; and, perhaps, in some measure, upon the strength and resistance in the constitution of the patient. The quotidian usually declares itself in the forenoon, when the motion of the body, after a state of rest, probably soon renders the load of fluids insupportable. As, in this form of intermittent, the accumulation is most rapid, so the cold stage is soonest overcome by the increasing fluids; but, as the seat of obstruction is at the surface, and may be more complete than in other forms of the disease, the hot stage is protracted, from the greater difficulty of removing this obstruction.

4. In the tertian, the disproportion between the ingress and egress of fluids being less than in the quotidian, a longer period is required before the vascular system is filled so as to produce a fit; and, for the reasons assigned above, the paroxysm is deferred till a later period of the day: and, from the slowness of accu-

mulation, the cold stage is of longer duration.

5. In the quartan, so slow is the vascular accumulation, that an interval of three days is required before insupportable plenitude is occasioned. And here again the paroxysm is generally deferred till the afternoon, from the more gradual progress of accumulation. The cold stage is longer than in the two preceding forms of the disease.

6. When the vessels arrive at the inconvenient state of plenitude that occasions a paroxysm, sickness and vomiting, the common attendants of vascular plethora, very often occur. I shall notice, here, that these symptoms happen, when the menses are suppressed in the first stage of pregnancy, in ideopathic apoplexy, in nephritic complaints that obstruct the flow of urine, &c. When fever is not attended with obstruction in the biliary ducts, the pressure of the fluids accumulated in the liver may create an

unusual flow through them, and this may be converted into bile in its passage. It may be again pressed out of the biliary canals by the mechanical effort of vomiting. Nay; in the most violent cases, the blood seems to be pressed through these canals, either mixed with bile, or imperfectly converted into that secretion. Such appears to be the case in black-vomit, or that which resembles coffee grounds. From the well known distention of this large viscus at this period (Jackson's Outline of Fever, p. 208.), and from the violent pressure made upon it in the act of vomiting, the great abundance and unnatural appearance of the bile is not very surprising. In the most violent forms of fever too, the red particles of blood sometimes appear to be pressed out of their proper channels, from ruptures of the vessels or otherwise, and exude through the coats of the stomach and intestines; while, at other times, they get into the cellular texture, giving the appearance of gangrene. Dr. Gregory says, in his lectures, that in violent inflammations, not

only the serous but the red globules get into the cellular membrane, and that he thinks this is the case in gangrene. In warm climates too, where the standard of circulation is high, the blood is pressed through the skin, eyes, nose, ears, &c.

7. This extraordinary and unjust plenitude of the vascular system is, I think, sufficient to account for all those enlargements of the heart, liver, spleen, &c. which we so frequently meet with in fevers. From the violent head-ach and delirium, that commonly attend violent cases, it has been frequently supposed that the head was the principal part affected; or that the head was the seat of the disease. At one time, indeed, I myself was inclined to adopt this opinion, from the distended state of the blood-vessels of the head as seen on dissection. But, at that time, I confess, I was less acquainted with the natural appearance of the brain than I am at present; and further experience has proved to me, that the appearances I then supposed to be

morbid are not peculiar to fever, as the following comparative dissection will shew. The two patients happened to die about the same time; the one, whose name was Elgas, of an acute remittent fever; and the other, whose name was Crow, of phthisis pulmonalis. The following is a copy of the note I made at the dissection.

Elgas.	Crow.
"The dura-mater	exhibited the same appearance in both.
The longitudinal sinus contained some dark coloured blood in its posterior part.	The longitudinal sinus contained a polypus of the colour of serum, which extended several inches in length.
Between the dura-mater and pia-mater was found scarcely any fluid.	Between the dura-mater and pia-mater there was a quantity of watery fluid, which ran out when the dura-mater was separated.

ELGAS.	CROW.
The veins and arteries of the pia-mater were very much distended in both subjects. There also appeared to be a considerable quantity of coagulable lymph under the pia-mater in both; and the general appearance of the surface of the brain was the same in both.	
The lateral ventricles were full of a watery fluid of a yellow colour.	The lateral ventricles were full of a watery fluid of a pale colour."

When the two bodies were covered, and nothing but the brains exposed, it was impossible for me or any of my assistants to say which was the fever patient and which the pulmonic.—The vessels of the head, therefore, although they suffer from pressure equally with those of other parts of the body, are not, I believe, so frequently inflamed as has been imagined. The fulness of the blood-vessels of the brain, as seen on dissection, depends, in a great measure, upon the position in which the patient dies; for, as the blood

after death always flows to the most depending part of the body, it will flow to the head if that lies low; although, on the other hand, as the pressure of the atmosphere is taken off by the structure of the cranium, the blood cannot entirely quit the head so as to leave the vessels flaccid. But to return to the abdominal viscera.

8. When those untoward symptoms of sickness and bilious vomiting occur in the first stages of fever, they not only portend excessive accumulation internally, and shew that the excretory ducts of the liver have been dilated; but they prove to us that it will be more difficult for nature or art to bring back the superabundant fluids to their proper channels; for, when they find an easy outlet through the liver, the necessary pressure upon the other excretory organs is taken off in some degree, and the obstruction is thereby rendered more difficult to remove.

9. During the cold stage of fever, the

fluids, which are the fountain of animal heat, having receded into the internal and larger vessels, the trunk of the body and parts adjacent are found of a higher temperature than the extremities, where the blood is in smaller quantity. But, when it returns to the extremities, as is the case in the hot stage, the heat is equally dispersed, and the limbs become equally hot with the body. As the heat of the surface depends upon the quantity of blood that undergoes the process of oxygination in a given time, so we find that it corresponds pretty accurately with the quickness of the pulse, and frequency of inspirations.

10. The hot stage does not bring with it any alleviation in the symptoms, notwithstanding the fluids become more diffused; because absorption is still going on from the intestines with its wonted rapidity, keeping up the distention internally. The long continued and violent pressure on the brain is attended with excruciating head-ach, which not unfre-

quently amounts to delirium. The arteries of the extremities, being now distended, their pulsation, of course, becomes perceptibly full and strong to the touch; but I have ever found this an imperfect and fallacious index in fevers. In this stage, but more frequently in the preceding one, the patient may become apoplectic, when the symptoms do not differ from ideopathic apoplexy. Indeed, the only distinction I can conceive to exist between the two is, the one probably happens from local weakness of some of the cerebral vessels; whereas the other is the consequence of general distention. Hence I am of opinion, that apoplexy is more allied to fever than most people are aware of. The late Dr. Irvine observed that "Patients were often considered as dying of apoplexy, who, in reality, fell victims to fever." (Some Observations on Diseases, &c. p. 27.)

11. I now come to the critical period of the febrile paroxysm, the sweating stage. If the patient is not destroyed during the

preceding stages, the pressure of the fluids at length overcomes the obstructions, and the system is delivered of its load by a copious flow of perspiration and urine. The symptoms also abate in proportion to the discharge.

12. But, although the superabundant fluids have found their exit through their proper channels, the mischief does not always cease, because the excretions return to their former state, and the balance of circulation continues unrestored. The ingress of fluids again exceeds the egress; and, according to the disproportion, so is the length of time required before the system regains its fulness, so as to produce another paroxysm.

13. If the balance of circulation is not speedily restored, the alternate process of filling and evacuating the vascular system becomes so habitual, that it is nearly as difficult to overcome it, as to restore the balance in the lymphatic system in those persons who have undergone periodical

tapping for dropsy. It is also from this periodical plenitude, whether fever is declared or not, that the large and vascular viscera, as the liver and spleen, become enlarged and indurated. In the same way it also appears to me, that we are enabled to account for the disease sometimes not occurring till after the person has left the unhealthy situation where he contracted it. The latent fever, that has been rendered habitual in the unhealthy place, goes on, from habit, long after the circumstances which brought it on have been changed; and any sudden occurrence thereafter, that further destroys the balance of circulation, brings on the paroxysm.

14. From what I have said of intermittent fevers, it will be easy to comprehend the phenomena of other kinds of fever. The remittent is more untoward and more dangerous than the intermittent; because, independent of the greater rapidity of accumulation, as the evacuation of the superabundant fluids is never complete in them, they, by being retained, produce a

certain vitiation in the common mass, for "à copia oriuntur malæ qualitates; sed non vice versa." (Sanctorius aph. xviii.) But to call such vitiation *putrefaction, ebullition, fermentation,* and the like, is making unjustifiable comparisons, that only tend to lead us into error. If putrefaction or corruption were the proximate cause of fever, would it not be reasonable to expect to find the critical discharges marked with such qualities? But when does this happen? Not in agues; not in remittents; not in the plague, nor yet in yellow fever. When a patient is seized with any of these disorders, and drops down in a fit of apoplexy, where is the time for the putrefactive fermentation to take place? But, if these changes were proved to happen, we should not know how to obviate them. Let us throw aside, then, all these idle speculations, and apply ourselves wholly to the removal of those morbid changes, which we know to happen. It is better that we should do the little we are able to do well, than to be eternally groping in the dark.

15. When we see that certain excretions have been suppressed, we know nothing more than that they are retained in the circulating mass; we understand no better the changes that these produce in the fluids, than we understand the changes that take place in secretion. As we know not that the changes, consequent on retained secretions, resemble any known process out of the body, we ought not to apply the same term to them that would class them with any such process. In all Remittent and Continued Fevers, then, it appears, that in addition to the danger arising from plethora, there is also considerable danger to be apprehended from vitiation of the fluids.

16. The term Bilious Fever has a very vague and confused meaning, being applied to every kind of fever where the bile is supposed to be concerned; or where there is the slightest appearance of yellowness in the eyes or upon the skin. Granting this extended signification of the term, a Bilious Fever may exist un-

der very different circumstances with respect to this secretion; it may exist when the bile is secreted in too great quantity, as from the mechanical pressure upon the liver and gall ducts during the effort of vomiting, or when the secretion of bile is obstructed, either solely, as in jaundice, or in common with other excretions, as is frequently the case in Remittents and Yellow Fever; or it may possibly exist from a regurgitation of bile after it has been secreted; or, lastly, it may exist from the reabsorption of bile from the alimentary canal, when little else is contained therein. These particular states of the biliary excretion in fever do not appear to have been sufficiently attended to by medical writers and practitioners.

17. Plague is a disease that may exist either with or without the loss of balance in circulation. I have seen bubos arise, and again recede, amongst other pestilential cases, without the slightest perceptible indisposition; and I have seen

small carbuncles, under similar circumstances, attended with little or no perceptible Fever. The Fever, then, in the plague, is purely symptomatic, as in wounds or other injuries inflicted upon the human frame. If the pestilential poison affects the skin and other excretory organs, so as to destroy the balance of circulation, plethora and fever generally follow: but, if it does not affect those organs, the local disease goes through its several stages without Fever. How this invisible agent acts upon the excretory organs, or how it produces thirst; or how common wounds do the same, we shall probably never be able to explain. When the balance of circulation is lost in plague, it is generally lost to a very considerable extent, producing symptoms resembling those of violent remittent fevers. The existence of the patient is frequently terminated by a fit of apoplexy, during the first paroxysm; but if the fluids are partially evacuated by the morning's warmth, so as to create a re-

mission, the next accumulation, or the next but one, seldom fails to close the scene. The symptoms, as in remittent fever, frequently lie latent till the vital principle is extinguished at once, by the pressure of the fluids upon the brain and other parts.

18. From what has been said of the foregoing forms of fever, it is scarcely necessary to mention the common continued fevers. Their character is stamped, as every one knows, by their suffering no remission, or critical evacuation at the end of the first paroxysm. Their first attack, however, is governed by the same laws as those of which I have been treating. There is a dry skin, attended, in general, with scarcity of excretions and thirst, proving that the balance of circulation has been lost. Continued fevers, however, may be either slow or rapid in their progress, according to the extent to which the balance of circulation has been lost. When the progress of accumulation is slow, there is not so much danger

to be apprehended from plethora as there is from subsequent vitiation of the fluids.

19. The exanthematous fevers make their first approach in the same manner as the foregoing; the various contagions having their several degrees of influence in destroying the balance of circulation. Some of these produce a febrile plenitude in the space of two or three days from their application, while others require no less than five or six.

20. The hectic fever itself is governed by the same laws as the preceding, and goes through its several stages with the same regularity. There is, first, the dry skin, paucity of urine and thirst; then there is increased heat of skin; and, lastly, a discharge of the superfluous humours by the skin and kidneys. If the paroxysms occur twice a day; and if these are less violent in their symptoms, it merely shews that the excretory organs in these subjects are less capa-

ble of resistance than in the robust, who fall the first victims in acute fevers.

21. In all the foregoing forms of fever, the perspiration, as being the most copious of the excretions, is principally concerned, although many of the others participate in destroying the balance of circulation. But it may happen, that any one of them is exclusively suppressed or impeded, while the symptoms that arise depend upon the quantity and quality of the fluid retained. Bonetus quotes a case of fever from Bartholin, in which the pancreatic duct was found to be obstructed (Clutterbuck's Inquiry into the Seat and Nature of Fever, p. 161).

22. A suppression of the lachrymal excretion attends the most violent forms of opthalmia. The purulent opthalmia, which I have seen in great abundance, usually, if not always, commences in this way. The disease begins with pain in the situation of the lachrymal glands and ducts leading from them to the outer can-

thus of the eye. Here also begins the swelling, owing, in all probability, to the effusion of the tears, or, possibly, the serum of the blood into the cellular membrane of the upper eye-lid. Very soon these collected fluids seem to be pressed through the *tunica conjunctiva*, and assume the form of pus. Lastly, if the accumulation goes on, the vessels and coats of the eye itself are burst and disorganized. I have frequently seen those phenomena succeed each other with such rapidity as to destroy the eye in the space of twenty-four hours.

23. I shall next make a few remarks on inflammation, and those fevers that are attended with local inflammatory affections. Various disputes have arisen, and various theories have been formed to account for the symptoms of inflammation. But the whole of these disputants and theorists appear to me to have overlooked the simple facts, while they have gone beyond the limits of sound and inductive reason, in search of fictitious and

hypothetical terms: and every change that has taken place in their doctrines has been a change of terms, rather than a change of meaning. Dr. Cullen (for I shall go no farther back) believed the proximate cause of inflammation to be *a spasm of the extreme arteries, supporting an increased action in the course of them* (First Lines, 245). And increased action of the inflamed vessels is, to this day, considered as the proximate cause of the disease; but how increased action and dilatation can happen in the same vessels at one and the same time I cannot comprehend; certainly there is no contradiction in medicine that requires explaining more than this. When any part is inflamed, we all see and acknowledge, that the diameter of the vessels that compose it, is enlarged; and that a greater quantity of blood than usual is contained therein. But it appears to me impossible, that the blood can be propelled with greater velocity through those vessels, or, more correctly speaking, through

those branches, than it can through those leading to and from them; unless, indeed, an internal and distinct circulation were established within the inflamed limits, which has not been proved. How can the water in a lake move with greater rapidity than the streams that run in and out of it? the banks may become dilated, but I cannot comprehend how this can increase the rapidity of the current. Let it suffice then to know, that vessels, in a state of inflammation, are enlarged in their diameter, and contain too great a quantity of fluids. When we know this, we are acquainted with an important fact; but when we add to this explanation terms that express imaginary and doubtful actions, we leave the path of true philosophy, and launch into the wilds of hypothesis and uncertainty. With inanimate matter, or, at least, with matter not human, such speculations might be indulged in; but where the life and health of man is at stake, we ought always to stick to the letter of truth and reason.

24. When any particular part of the body is thus affected with relaxation of its vessels to any considerable extent, the whole body participates in the mischief. The excretions become obstructed, while thirst, and other febrile symptoms are generated. A general fulness ensues that increases the local malady. The minute vessels that previously conveyed the finer fluids, being distended beyond their proper dimensions, now convey the red globules; while coagulable lymph, being deposited in the cavities, forms a bed, through which the still finer fluids continue to flow, giving rise to newly formed vessels.

25. From the foregoing observations, it will be easily seen that local inflammation may precede or succeed to the loss of balance in the circulating system. When the vessels become relaxed from local injury, the excretory organs are affected by sympathy or otherwise, so as to destroy the balance. On the other hand:

when the equilibrium is first destroyed, the general fulness may overpower certain parts that happen to make the least resistance, although these may have received no local injury beforehand.

CHAP. IV.

1. With respect to the particular causes, that, by their combination with the human body, give rise to fever, they are doubtless in considerable variety; but, with the whole of them, the excretory organs and lacteal vessels seem to be particularly concerned.

2. Miasma is a name given to an imaginary matter or quality of the air, which combines particularly with the skin of the human subject, impeding the flow of perspirable fluid, and thereby destroying the balance of circulation. If this supposed matter or quality of the air affected the lungs, it is extremely probable that other animals would contract the disease, since the structure of the lungs, in many animals, resembles that of the human lungs. But as the skin of man is, in general, much more sensitive and porous than theirs, it

is much more liable to have its functions disarranged.

3. Whether or not miasma is any thing more than the diurnal change of temperature and humidity, which I have already noticed, is extremely questionable; for it is only in those situations, where the diurnal changes are great and regular, that it is to be found. It is generally considered as the production of animal and vegetable putrefaction; but this opinion, I contend, is erroneous, inasmuch as, in warm latitudes, it is in the greatest abundance at those very seasons, and in those very situations, where both animal and vegetable life are in their greatest luxuriance and health. It abounds in and about irrigated gardens and running streams, where animal matter is scarcely to be seen, and where vegetation is particularly flourishing. Damp houses too, where there is neither vegetable nor animal putrefaction, are very liable to give rise to intermittent and other fevers. In the pontine marshes near Rome, vegetation is parti-

cularly exuberant during the unhealthy season, while nothing like animal putrefaction can be discovered. Marsh miasma, then, I think, ought to be considered, till the contrary is proved, as a diurnal change in the temperature of a humid atmosphere, which produces a corresponding flux and reflux in the vascular system.

4. Miasma (for I have no objection to the name) occurs in greatest abundance in the autumnal season: that is, when the standard quantity of perspiration has been augmented to its maximum by the summer's heat; but also, when the evenings become damp and cold. The fevers of summer are equally violent with those of autumn; but, as the flux and reflux of the fluids have not been established at this time of the year, they are generally found to be of a continued form.

5. In temperate and cold climates, the body is more subject to local affections than in warmer ones, from its being more

partially exposed to cold, or currents of cold air. In warm climates, the body is more liable to general febrile affections, from the whole surface being there more generally exposed. In these situations too, we are more liable to be deceived by our sensations; for we are not aware, while we are sleeping at night, exposed to the grateful breeze, that the balance of circulation may be destroyed to a much greater extent than in countries of frost and snow, where the standard quantity of perspiration is comparatively small.

6. In warm countries, again, where the perspiration has been obstructed for a short time, we feel heavy and sleepy from vascular distention, so that we frequently submit to the obstruction, and even encourage it for want of motion. If a person, in this state, has resolution enough to rouse himself, and walk a few paces, he soon feels so much lighter, that he experiences greater pleasure in continuing his exercise than in returning to his former state of somnolency.

7. The laws and habitudes of contagions are, in many respects, widely different from those of miasma. The latter occurs principally at certain seasons of the year from natural combinations that take place upon the spot; whereas the former are generated from their own species. These are propagated upon or within the bodies of the human species, from whence they are diffused through the air of the atmosphere or otherwise, till they combine with other bodies, and thus increase their influence. I do not pretend to say that contagions must necessarily be diffused or mixed with the air, because they have never been detected in it. They are as likely to influence bodies within a certain distance, by laws and qualities peculiar to themselves, without contact or the intervention of any medium as with them. No connecting medium is now thought of to account for the phenomena of attraction, repulsion, gravitation or magnetism: why may we not admit, therefore, similar qualities to exist in contagions? However distinct the several species of febrile

contagion may be, they seem to possess one common quality in different degrees of strength, viz. that of destroying the balance of circulation, by diminishing the egress, and increasing the ingress of fluids of the vascular system. The balance may be destroyed by the influence of one of these causes alone; or it may be occasioned by two or more combined, modifying the future contagion and character of the disease according to the influence of each. If, for example, pestilential contagion exists where there is miasma, the character of the disease is converted into that of plague.*

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* Nothing contributes more towards destroying the balance of circulation in warm climates, than the sudden transition from an active to an inactive state of the body. There, the least exercise commonly creates sensible perspiration, while the lacteal absorption is proportionally augmented; but total inactivity is as unfavourable to this excretion as exercise promotes it. Consequently we find that fevers are most prevalent amongst soldiers after fatiguing marches, particularly when they have been moved from warm to cold and damp quarters. Such change in the circumstances of the soldier, which necessarily takes

place on his being seized with fever is, in general, too little attended to by the army practitioner. But, in addition to the want of motion, he is placed in an horizontal position, which favours the gravitation of the blood towards the head.

CHAP. V.

1. I now come to that part of the doctrine of fever which relates to art, in preventing or removing the phenomena I have described; but, before I take notice of the particular agents we are to employ, I shall attempt to explain the principles upon which art may be had recourse to. It was observed, in a former part of this paper, that any series of events may be interrupted or turned in their course at every step, according to the agents that happen to fall in the way or are opposed to them; and, that it is owing to the uniform presence of certain agents that certain trains of events become uniform. In order, therefore, to prevent the first combinations that give rise to a successive train of morbid events, we are to ascertain the presence and qualities of these agents, and either keep them apart from the body, or oppose to them other agents which may change their qualities, and

anticipate the morbid combination. The qualities of contagions, for example, are attempted to be changed by means of heat and fumigation, while the quality of the body itself may be changed by the application of certain other agents. The combination of small-pox contagion with the human body, for example, may be anticipated and prevented by the application of cow-pox matter.

2. When, however, a morbid combination has already taken place, and we know that such other agents are present as are likely to favour a continued series of them, we are then to apply ourselves in endeavouring either to withdraw them from the body, or to oppose to them such other agents as are likely to change the series and restore the healthy succession. Towards the accomplishment of these ends, it is necessary that we should attend to every step of the events that are going on, for very different agents are required in the different periods of succession.

Hence it is that sudorifics are not required in the sweating stage of an intermittent, nor wine and bark in the hot stage.

3. I shall now take notice of the various agents that are most likely to accomplish the ends we have in view; but should these be found inadequate, it does not derogate from the doctrine itself. We may thoroughly understand the theory of the burning of a house, though we may not possess the means of extinguishing the flames. It is unnecessary to enlarge upon the mode of keeping apart from the body those causes that are known to destroy the balance of circulation. Nothing more is required than to pursue the antient maxim *citò, longè, tardè;* which is a business of police rather than of medical art; but to change the combination of events, so as to anticipate a morbid change, belongs to the physician's province. There are two ways, as I have said before, of anticipating morbid events, 1st, by changing the qualities of the ex-

ternal cause; and secondly, by changing the state of the body itself, and thus rendering it unsusceptible.

4. If Marsh Miasma merely consists of a daily alternation of heat and cold with humidity (and this, I believe, is all we know respecting its sensible qualities), it is obvious to every one, how far we have it in our power to change these qualities: the only means we possess, perhaps, are draining damp situations that admit of it, and rarifying the air around us, during the night, by means of fires.

5. To change the qualities of contagions is a difficult and uncertain operation at best: heat and cold are said to do it; but this is extremely doubtful, for I cannot learn, from good authority, that even the plague ceases in the summer months, as it is said to do; and in winter it ceases for a more obvious reason than that of the contagion being corrected by cold. The quality of the body itself is changed at this season, which renders it

less liable to combine with the poison; and as to the combinations with smoke, and all the farrago of materials, commonly employed for purifying infected air and clothing, I must leave their effects to be proved and explained by those who use them.

6. The means we possess of rendering the body unsusceptible of combining with contagions, and other febrile causes, are very few, and, with the exception of cow-pox matter, in preventing the union of small-pox contagion, they are all uncertain. Our indications, however, are to preserve, at all times, the balance between the ingress and egress of circulating fluids, and ensure to each excretory organ its due proportion in the evacuating process. The functions of the skin are to be preserved by an equable temperature and cleanliness, and if this is not sufficient, inunction with fine oil, sparingly employed, will generally preserve a due quantity of perspiration. Regularity in exercise, in whatever quantity it is taken,

should be particularly attended to, as tending to preserve the due quantity of all the excretions: attention should also be paid to the ingress of fluids; and as costiveness is the principal indication of this being too great, it is to be obviated by gentle laxatives. There is another way of intercepting the combination of contagion with the skin, which is worthy of consideration; it consists in covering the body all over with an oil-skin dress. The practice was adopted at Malta, during the late pestilential season, and with apparent success; for none of the assistants in the British pest hospital had the disease, who adopted this practice: as these, however, made use of oil at the same time, their escaping cannot be entirely attributed to the oil-skin dress. As the thing is rational, it is worthy of notice. I shall now point out the means to be employed in removing the febrile state when it has actually occurred.

7. As this state of the body seems to consist in the loss of balance between the

ingress and egress of the circulating fluids, and of a consequent accumulation in the vascular system, it is obvious, that to reduce the column of fluids to their proper quantity, and to restore the balance of circulation, previous to the vitiation of the fluids from retention of the excretions, is to cure the disease.

8. It is the physician's duty, first, to ascertain how the balance of circulation has been lost; whether the ingress is too great, or the egress too small in quantity; or whether both these circumstances are combined: should he find the bowels unusually costive, while the patient has a dry tongue, and complains of thirst, he may be assured that the lacteal absorption is too rapid: this being the case, it is evident that purgatives are required to restore the natural descent of the fæces, and such other remedies that are known to allay thirst, and constringe the mouths of the lacteal vessels. A great variety of substances may be employed to accomplish the first intention, while acids and the

Peruvian bark are peculiarly adapted to fulfil the latter. If, in addition to the above symptoms, there appears to be a deficiency of bile, as may be ascertained by the colour of the excrements and of the skin, the use of mercurial preparations, which have a peculiar effect in relaxing the glands, is especially indicated; and, for this purpose, the submuriate of mercury, taken internally, is generally preferred, because it has the two-fold effect of obviating costiveness, and resolving the glandular obstructions. Internal preparations are also preferable to external ones in these cases, in general; because they are applied more immediately to the part: they likewise restore the salivary excretion, which is by no means an unimportant one.

9. If Fever is attended with a deficiency of any of the other excretions, these are to be attended to by the physician with equal circumspection. The perspiration, as being the most copious of the human excretions, is the most im-

portant: the state of the skin, therefore, should be particularly observed; and when there is seen to be a deficiency, it should be restored, with all due care, by such remedies as are known best to answer this end: but too copious an evacuation may be as pernicious as the reverse, as it operates to the prejudice of the other excretions. I have seen the most alarming symptoms of Fever removed by creating profuse perspiration, but the patient has afterwards died from the total suppression of other excretions, as that of the urine: the utmost care, therefore, is requisite in procuring a flow of perspiration in due quantity and no more. The state of the skin, as well as of the other organs of circulation, is not to be ascertained, in general, by the cursory visit of a superficial observer; it is only to be ascertained by a vigilant and patient enquiry: it is not merely necessary to know that a general obstruction of the pores exists, but how long it has continued. The task may appear painful, but with-

out accomplishing it, we must ever act with uncertainty.

10. There are various agents to be employed for the restoration of the cuticular discharge both external and internal. But as the former class do not disorder the stomach, I generally give them the preference. I have seen indeed such dreadful consequences succeed after the administration of emetics, and antimonial medicines in particular, that I would always dispense with their use, when less dangerous remedies would answer the purpose. When the vessels of the stomach have been already too much distended with blood, I have known them brought to a state of inflammation and gangrene by the exhibition of antimony; and I have seen vomiting excited in this way which has only ceased with the patient's life*. From the increased pressure of the fluids

* See Dr. Burnett's Account of the Mediterranean Fever, p. 33.

upon the brain during the efforts of vomiting, coma and apoplexy are frequently occasioned. At one time, I had two patients brought to me, the one labouring under apoplexy, and the other under hemiplegia, both of which affections were brought on by the self-administration of emetics in the incipient stage of fever.

11. I have found, in my own practice, the external agents, for restoring the perspirable fluid, much more powerful, speedy, and permanent in their operation than the internal ones. They consist of bathing in a suitable temperature; regulating the temperature of the air; putting on suitable clothing; friction upon the skin; exercise as far as circumstances will admit of it; and applying oleaginous substances upon the skin to soften and render it pervious*. These and similar agents,

* The ancient Greeks and Romans, who were more exposed to febrile causes than we are, from their inhabiting warmer climates, seem to have been better acquainted both with the importance of the functions of the skin, and with

from their being applied immediately to the part affected, and being open to our observation, are infinitely more manageable than such as are administered internally. The particular agent to be employed in each case must, of course, be left to the judgment of the practitioner.

12. When the pulmonary exhalation is deficient, it is to be restored by the means best calculated for effecting this end. In general, I think, the sympathy, existing between the skin and lungs, is such, that when the functions of the one are restored, those of the other are also. This, however, may not be the case universally, and the quantity of the pulmonary exhalation in fevers should never be disregarded by the physician. The remedy best adapted to restore the excretion is, inhaling the steam of warm water into the

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the art of preserving them. Hence the frequent use of the bath and inunction. "Illuvies siccat (says Hippocrates) quum humiditas consumatur. Similiter etiam unctionis neglectus."

lungs, by holding the head over a vessel containing it. I am disposed to believe, that it is this process which renders the supping of warm diluent fluids so effectual in creating perspiration as well as pulmonary excretion.

13. The renal secretion is further from the reach of art than either of the two preceding, but it requires to be equally attended to by the physician in febrile affections, and regulated, as far as can be done, by the means we possess. The saline preparations, as the nitrate of potass, the acetate of ammonia, &c. or camphor, or opium alone or combined with other ingredients, are indicated, when the secretion is deficient. Exercise, and the upright position of the body, when practicable, are powerful auxiliaries in promoting urine. As it is not my intention to discuss the qualities of every remedy that has been employed for restoring the several excretions, I shall leave the rest for the consideration and choice of the practitioner; I merely mention the above

agents, as it were, to illustrate my doctrine. In every attack of fever, then, it is the physician's duty to watch over the various functions of circulation, and restore those, which he finds disordered, to their natural state. He must consider what is the natural quantity of fluids that percolate through the body in each particular climate, season, and subject; and reckon upon the increase that may have occurred. He must carefully compare the quantity of excretions with each other, and with the ingress flowing in through the thoracic duct; and the more accurately he observes these phenomena, the better will be his data for prescribing.

14. I now come to speak of a most important and powerful agent in febrile affections; the principles upon which it ought to be employed, however, have not yet been understood or established. The agent I allude to is blood-letting. From the facility of evacuating the superabundant fluids in this way; and from the immediate relief afforded to the symptoms,

it is not surprising that blood-letting should have been abused in all ages by those who were ignorant of the principles upon which they acted; while, on the other hand, it is not very wonderful that others, seeing its ultimate failure, should neglect and discard it altogether.

15. Because blood-letting evacuates the superabundant fluids, and gives immediate relief to the system, it does not follow that it has been properly employed; for it does this in the hot stage of intermittents, yet experience does not sanction its use. The operation of tapping in dropsy seldom fails to afford relief, but it has little to do in curing the disease; that being effected by restoring the balance between the exhaling and absorbing fluids. Neither is ultimate recovery a proof of the efficacy of blood-letting in all cases. A man may recover after he has swallowed a dose of arsenic, though it may not be this drug that saved his life. There is a way of explaining the necessity of blood-letting in fevers, as well

as that of employing some other powerful agents, which has obtained amongst modern practitioners, but which cannot be too much discouraged: that is, to *cut short* the disease, and to give a *shock* to the system. Such terms as these, from their quaintness and facility in giving a reason, are seized upon with eagerness by young minds, and are found very convenient for reconciling the ignorant: but their meaning is too general and vague to be admitted into a sober and philosophical disquisition. People, who act upon principles like these, are as much beneath the scientific physician, as the ploughman who knocks his watch against a post to make it go, is beneath the skilful watchmaker.

16. Blood-letting, though an useful and important remedy in fever, is but secondary to those I have already pointed out. It is to be employed, 1st. in all those cases where the accumulation of fluids is so great, that we cannot hope to reduce

them through their natural outlets; or, where the danger of delay renders an immediate evacuation necessary. 2dly. When there is considerable local accumulation in any of the important viscera, as the lungs, liver, intestines, brain, &c. which threatens destruction or disorganization to the parts, or threatening apoplexy. Lastly, When the vessels of any important organ have been actually burst.

17. As all the means we possess for evacuating the fluids through their natural channels require, in general, considerable time in their operation; and as increased absorption is commonly going on at the same time from the intestines, retarding further the accomplishment of our intention, we may frequently gain time and shorten the process, with very great advantage, by having recourse to the lancet. But the quantity to be taken and the frequency of repetition should be regulated upon the principles I have laid down, and not, as is too frequently the

case, upon the principle of removing the disease by bleeding alone*. Because we have mitigated the symptoms by this temporary remedy, we are not to relax in our endeavours to restore the balance of circulation. When proper attention is paid to the natural outlets, the necessity of very copious bleedings will also be prevented. "Multum et repente evacuare, aut replere, aut calefacere, aut frigefacere; aut omnino quomodocunque corpus movere, periculosum est. Et omnis multitudo naturæ contraria est. Quod verò paulatim fit, tutum est." (Hipp.)

18. When there is topical plethora of any particular part, with little or no general

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* It would be impossible, in the present state of our knowledge, to lay down rules, with any degree of accuracy, as to the quantity of blood to be drawn in each particular case, or to the frequency of repeating the evacuation. There may be instances in which bleeding may be properly carried to the extent now practised; but I am very much inclined to think that excessive blood-letting might be dispensed with very often were proper attention paid to the natural excretions.

affection, topical evacuations, by means of leeches and blisters, will, in general, be sufficient, while we guard against general plethora by preserving the balance of circulation. But when there is topical plethora, with lost balance of circulation, general bleeding will be frequently required, paying due attention at the same time to the natural evacuations.

19. As general bleeding operates frequently against the natural excretions, by taking off the pressure of the fluids, the greatest judgment is requisite in knowing when it ought to be had recourse to; and, this being the case, we ought to be doubly vigilant in attending to the subsequent excretions. I recollect a case of mine, in a man, whose name was Mealy (a very stout man,) who had been labouring under latent fever for two or three days; he complained of nothing but an aversion to move, and kept his bed continually. At length I ordered him to be bled, which rendered him more lively for the time; but, from

neglecting, at that time, the natural excretions, he had a regular paroxysm of ague in twenty-four hours afterwards. In another instance, a gentleman was bled for very slight symptoms of hæmoptoe. He felt lighter and pleasanter after the operation; but, in six and thirty hours afterwards, or thereabouts, the hæmoptoe returned with ten-fold violence. In opthalmia, in particular, I have seen bleeding rendered as habitual and necessary, for want of the natural excretions, as the periodical expulsion of the fæces.

20. I shall conclude these observations on bleeding by giving a table of the comparative success of copious and indiscriminate bleeding, in a corps of infantry, and in nine other corps where this practice was not carried beyond the bounds of moderation.

Corps No.	Admitted.	Deaths.	Proportion.	REMARKS.
1	112	2	1 in 56	
2	30	0	——	
3	55	0	——	
4	167	1	1 in 167	
5	45	1	1 in 45	This detachment was situated in a very unhealthy spot.
6	13	2	1 in 6½	
7	372	4	1 in 93	
8	157	3	1 in 52½	Besides these, two other cases, denominated in the Reports (from which this table is taken) the one phrenitis, and the other hepatitis, proved fatal in this corps, which, if considered as fevers, would make the proportion 1 in 21.
9	49	1	1 in 49	
10 *(Corps alluded to)*	210	8	1 in 26	

The last corps was not situated in a more unhealthy spot than the rest; but it was from the *activity* of the practice pursued in it, that accounts for the great proportion of cases.

21. The foregoing remedies I have considered as evacuants principally; and as such, they afford temporary relief to the system. But, after we have reduced the fluids to their proper quantity, the grand object is still to attain; viz. to restore and preserve the balance of circulation. It frequently happens, particularly in slight cases, that nature performs the cure; or the functions of the circulating system, being relieved of their load, return spontaneously to their natural state. This, however, may not be the case; and it belongs to the province of the physician to observe whether it is so or not, and to assist nature where he sees she is deficient. The same remedies, in general, are required for keeping up the due proportion of excretions as for restoring them; but there are other agents

to be taken into the stomach, which I have already mentioned, that prevent the too rapid absorption from the intestines. They consist of bark, bitters, acids, and the like. Where the fluids have been properly evacuated, nothing contributes towards preserving the due balance of circulation more than exercise in the open air.

22. I have thus given, as it were, an outline of the principles upon which, I think, a system might be formed for the treatment of febrile affections. I am too well aware of the imperfections and crude state of the present work: it has been written in the intervals which an itinerant life affords, without the aid of a library, and under various other disadvantages.

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