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Section, *Hydrotherapy*

No. *5066*

AN
A B R I D G M E N T
OF THE SECOND EDITION OF A WORK, WRITTEN
BY DR. CURRIE, OF *Liverpool* IN *England*,
ON THE USE OF WATER,
IN DISEASES OF THE HUMAN FRAME;
AND ON
FEVER, OPIUM, STRONG DRINK,
ABSTINENCE FROM FOOD,
AND THE
PASSAGES THROUGH THE HUMAN SKIN;
WITH OCCASIONAL REMARKS.

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P R E E A C E.

THE following abridgment, with the remarks accompanying it, first appeared in successive numbers in the Kennebec Intelligencer for November 17 and 24, and December 1, 8, and 15, 1798. It was conceived that advantage might result from the whole being reprinted in the form of a pamphlet, to insure both its preservation and its circulation among new readers. The author has availed himself of this opportunity to make a few corrections and improvements. There was the more room for this, owing to the extreme haste of the first publication, which was precipitated in order to put the American public into the earliest possible possession of such important materials.

That the facts respecting the use of *cold water* in certain diseases, as detailed in these sheets, may seem applicable to the case of the inhabitants of the United States; the author of this abridgment has judged it proper to cite the following evidence of some eminent physicians of America, on this subject.

In the 'History of the *yellow fever*, as it appeared in the city of New-York in 1795, by Dr. Alexander Hockack, jun. of that city,' we are told that 'the most certain and successful means [of cure] were, to wash the whole surface of the body with *cold vinegar* and water; and, immediately after, covering the patient with blankets, to administer such medicines as possess the effect of bringing on sweating. Of these, the *spiritus Mindereri* and saline draughts of Riverius succeeded well; more especially if the warm drinks were continued;

' nued ; such as the infusion of snake-root, gruel, toast
 ' water, tamarind water, lemonade, &c. These were
 ' much aided by applying to the feet of the patient a
 ' warm brick, steeped in vinegar and covered in a flannel
 ' cloth wet with vinegar or spirits : the steam, thus
 ' emitted and diffused through the bed, had a wonderful
 ' effect in softening the skin and exciting sweat ;
 ' especially where the *cold* washing had been previously
 ' employed.

' Some practitioners have preferred the practice of
 ' plunging the patient several times in a cold bath, and
 ' violently dashing the body with cold water. But
 ' simply washing the patient with cloths dipped in *cold*
 ' vinegar and water, was found much preferable to immersion† ;
 ' both because it more effectually diminished
 ' the heat of the system and was less fatiguing to the
 ' patient. Experiments have proved, that repeatedly
 ' wiping and washing with water, in the ordinary way
 ' in which the operation is performed ; diminished the
 ' heat 7 or 8 degrees more than simple immersion, or
 ' dashing it over the body with pails.

' The practice of cold bathing in fevers of this type,
 ' is not a new one, but was very commonly employed
 ' at Breslaw in Silesia ; and of late years has been very
 ' successfully applied in the West-Indies,* as well as in
 ' different parts of Europe, where diseases of this type
 ' prevail.

' Professor Gregory of Edinburgh, and Dr. Currie,
 ' an eminent physician at Liverpool, have also prescribed
 ' it with great advantage in the low typhus fevers
 ' of those cities. But its great success in the *New-York*
 ' hospital as employed by Dr. Samuel Bard, and in the
 ' private

† Before deciding here, we must consult Dr. Currie.

* See Dr. Jackson on the Diseases of Jamaica.

private practice of my *brother*, have fully convinced me of its use.

It is also proper to remark, that where the physician was not called to the patient in the first stage of the disease, and putrid symptoms had appeared and the patient had become much debilitated, the cold bath was injurious: and from the abuse of cold bathing, by employing it in the *last* stage of the disease, it has fallen into disrepute with some practitioners. But as the abuse of a thing is no argument against its use, I repeat my observation, that in the *first or inflammato-*ry stage of the disease, it was one of the most useful remedies that was employed.

When the cold bath had been thus made use of, and immediately after followed by the spiritus Mindereri or saline mixture, with plentiful dilution, it rarely failed to produce sweating in the course of 15 minutes; and when once induced, it was easily continued by the repetition of the sudorific medicines and drinks, until a solution of the fever was obtained. In some instances, where the patient refused his drink and medicines, or from the carelessness of the nurses they had not been supplied as frequently as was proper, and the perspiration had been suppressed, it became necessary to repeat the cold bathing; which seldom failed to procure a return of the *sweating*. By the continuance of this discharge, an abatement of all the symptoms took place. It appeared to operate as a specific in the disease; the pulse in a short time became moderate; the heat of the skin diminished; the pain in the head and back, before so distressing, was also relieved; the sickness of stomach and vomiting were removed; and in the course of two or three days from the attack, the patient had little else to contend with but mere debility.

Thus

Thus far Dr. A. Hofack, jun. who, as we perceive, cites the authority of his brother Dr. D. Hofack, and of Dr. G. Bard, both of New-York, in addition to his own. We must observe, that neither of these gentlemen, at the time of the publication of Dr. A. Hofack's pamphlet, had seen the larger work of Dr. Currie; of which the first edition appeared at the close of 1797, and the second in 1798. This work therefore merits an examination by itself, even by the physicians of New-York.—One of them, whose name has not yet been mentioned, but whose own productions are read even in the centre of Germany, mentions in a private letter, that Dr. Currie's work did not reach New-York till the present year (1799.) He himself says of it, that 'it appears to be a judicious and interesting practical work.' But not to dwell upon an opinion given incidentally only, however weighty may be the judgment of the party; we proceed to other evidence.

An American physician, whose name is known in every part of the civilized world, states that 'he can from the experience of five years, subscribe to all Dr. Currie's remarks upon the use of cold water in the disease which has lately afflicted * * * Philadelphia.' He adds, 'Its efficacy is now admitted by nearly all our physicians.—It is so far from interfering with, that it aids the operations of bleeding, and mercury. Where cold water has been too feeble to compose the inordinate actions of the blood vessels, I have used *ice* with great advantage. When the head is much afflicted, I confine the ice in a bladder and apply it to the forehead. In a few minutes I have seen it abate pain, remove a delirium, and sometimes induce the most salutary sleep.—Its effects are equally obvious when applied to the seats of *violent* disease in other parts of the body; provided none of those circumstances for-

bid

“bid its application, which are mentioned by Dr. Currie.”

Whoever wishes to see farther information upon this subject, may consult some of the medical publications, periodical and other, which have lately appeared at Philadelphia and New-York.

The *simplicity* of applications of this kind will not supersede the necessity of employing medical practitioners. They are the best judges when to use, and when to avoid certain remedies ; as likewise how to guard against those many unforeseen or difficult circumstances, which cannot be submitted to general rules.

It were to be wished however, and particularly in the country parts of the United States, that more of these simple applications were attended to. Theorists have sometimes considered the diseased affections of the human body, as depending upon the chemical state of the humors (as they have been called ;) sometimes upon the extreme fulness of the vessels ; sometimes upon the morbid powers of the living animal, and so on. But it were to be wished, that theorists would sometimes also consider the body, in *life*, as open to the influence of some of those principles, which produce effects upon it when *dead*. Gargles made of vinegar, of salt, of pepper or of astringent substances, separately employed or else combined together ; have been highly useful in sore-throats, where putridity has threatened ; and they might equally be employed in other instances. Bark in like manner, has been exhibited to the outside of the body, with evident benefit, in other putrid cases. Salt has not perhaps been tried externally in cases tending to putridity, or in other words to *mortification* ; but it certainly merits an experiment. But what most promises success is the powder of *fresh-made* charcoal ; on account of its astorishing powers not only in delaying
putrefaction.

putrefaction in dead flesh, but even in restoring its sweetness, when a taint of putrefaction has manifested itself. It removes putridity even from water rendered green by corruption ; and water is supposed to be the basis of many fluid substances, not excepting a number of those in the human body.

These hints are offered with diffidence ; but the trials to which they lead, may be made with safety, and especially where other remedies have failed of the desired operation. One single successful practice resulting from them, will abundantly compensate for the trouble of bestowing a little thought upon them ; and the life and ease of man, and we may add of beasts, (for these practices may be extended to beasts) merit some exertion ; not only as objects of our immediate concern, but as preparing relief in case of accidents to ourselves.

*April, 1799 ;
Kennebec County, Maine.*

N. B. For some addenda, &c. see the end.



An Abridgment of a work intituled,
' Medical Reports on the Effects of
' *Water*, cold and warm, as a remedy
' in fever and other diseases, whether
' applied to the surface of the body or
' used internally ; including an enquiry
' into the circumstances that render cold
' drink or the cold bath dangerous in
' health :—To which are added, obser-
' vations on the nature of *fever* ; and on
' the effects of *opium*, *alcohol* and *ina-*
' *nition*.—The *second* edition, corrected
' and enlarged. By JAMES CURRIE,
' M. D. F. R. S. Physician in Liverpool,
' and Fellow of the Royal College of
' Physicians, Edinburgh. Printed at Li-
' verpool, 1798.'

N. B. Some remarks are intermixed with
this Abridgment, written in 1798.

DR. CURRIE has published a work in medicine
apparently of the utmost importance, and particularly
so to the United States ; for whose now reigning dis-
ease, it flatters us with some appearance of relief, if not
of cure. The veracity of the author in all situations,
is as well established as his reputation for solid and in-
genious talents.

Dr. William Wright, F. R. S. formerly of Jamaica, and well known for his writings in medicine and botany, seems to have furnished a case to our author, which, joined to his own previous opinions, led him to the train of practice and observation of which we are about to give the account.—Dr. Wright, while on a voyage from Jamaica in 1777, being attacked with fever, on the third day of it, ordered three buckets of salt water to be thrown upon himself, which gave him instant relief; and this, being repeated on the two following days, removed every symptom of disease. Another passenger, whose attack from fever had begun on August 9, copied the example, and was restored to health. A seaman, who originally communicated the fever to Dr. Wright, refusing proper assistance, died. Encouraged by these incidents, and finding that Dr. Brandreth of Liverpool, had employed cold water externally in cases of fever, with happy effects; Dr. Currie resolved upon a series of experiments.

In December 1787, Dr. Currie, in seven cases of contagious fever, threw cold water from a bucket upon the body of each patient; and the whole recovered. An eighth patient died, with whom the practice was omitted. The cure was *chiefly intrusted to this remedy* in 153 cases, of which the author kept a register; besides many *subsequent* cases, of which he kept no register, unless where the application failed of success.

The 30th regiment of British infantry, in particular, while quartered at Liverpool in 1792, afforded him an opportunity of trying this application with some precision; and the result of the experiment is instructive. A guard-room, prison-room, two sick-rooms, and a cellar, bad, by their foulness, either caused or increased a fever, which soon affected a number in the regiment. Dr. Currie being called in, the primary causes of the disas-

ter were removed, and the patients all cleansed. Those whose strength was not greatly reduced, had cold salt-water poured upon them ; and the rest were spunged over with tepid vinegar. The remainder of the regiment was drawn up in its ranks, and seventeen others who had marks of the disease were separated, and subjected to the cold affusion ;* which cut the disease short in all but two of these. Those who were yet well, were ordered to bathe in the sea ; being regularly mustered for that purpose. The number infected in the whole was 58 ; of whom 26 had the disease, by these means, brought suddenly to a close ; but in the remaining 32 it ran its course. It was fatal, however, only to two ; who had been weakened by visiting the West-Indies and by being bled, and who besides had not received the cold asperision, not having been visited by Dr. Currie till the 12th or 14th day of the disease. The fever broke out about the beginning of June, but no new attack occurred after the 13th of that month. The water employed was taken from the river Mersey ; having in it 1-32 or 1-33 part of sea-salt ; and being of the temperature of 58 or 60 degrees of Fahrenheit's, which is our common thermometer.

When Dr. Currie speaks of fever simply, he means the low contagious fever ; which frequently is called the nervous, and in certain cases the putrid, fever ; being the common fever of England, and prevailing chiefly among the poor, who are most exposed to the causes producing it. Dr. Cullen gives it the name of *Typhus* ; terming it *a contagious fever ; in which the heat is but little increased ; the pulse small, weak, and mostly quick ;* the

* By affusion or asperision, the author means the pouring of water upon a patient, as for example, from a bucket.

the urine scarcely changed ; the functions of the brain and senses much disturbed ; and the strength greatly reduced.

In fevers called *continued*, there is nevertheless (see Dr. Cullen and others) at least one increase and one abatement in each day. This increase of the fever is known by thirst, restlessness, and increased flushing ; and also by the heat in the internal parts of the body, raising the thermometer one or two degrees beyond the average observed during other moments of the fever. As this increase (or paroxysm) usually occurs in the afternoon or evening, Dr. Currie prefers this period (other things being equal) for the cold affusion ; thinking it most *safe*, as well as most *useful*, to apply the water at the height of the fit or immediately after it has begun to decline. But he says, that the remedy may be safely used, *when there is no sense of chilliness present, when the heat of the surface is steadily above what is natural, and when there is no general or profuse perspiration ;* which he observes, are particulars of the utmost importance.

During the cold stage of the fever, the cold water nearly suspends the respiration, greatly disturbs the pulse, increases the chill, and seems to bring on the struggles of death ; and really would do so, if repeated. The thermometer therefore is never to govern the practitioner, where the chilliness of the patient contradicts its indications. On the other hand, the absence of chilliness is no guide, unless the thermometer concurs to shew a heat more than natural. Lastly, profuse perspiration, in fever, must for the time, deter from the operation ; and especially in proportion to its continuance. Though perspiration is in itself a cooling process, yet the load of heated bed-cloaths may prevent an *internal* diminution of the heat from being immediately perceived.

ceived. Under these restrictions, Dr. Currie thinks, that the cold affusion may be used at any period of fever ; but preferably in the beginning.

The author seems after each affusion to have rubbed the body *hastily* with towels.

The cold affusion generally reduces the heat from 2 to 6 degrees of Fahrenheit's thermometer ; and the pulse sinks by it from 2 to above 20 beats in the minute ; and in one case, somewhat dubious indeed as to its issue, it fell at least 40 beats.

Where the heat is reduced and the debility great, some cordial should be given immediately after the affusion ; and the author thinks that warm wine is the best. In case the affusion produces effects unusually severe, then to the *cautious* use of warm cordials in small quantities, friction and especially of the extremities, is to be added, and a bladder of hot water applied to the pit of the stomach.

Several examples are given of the effect of the cold affusion in the first, second, third, fourth, and succeeding days of fever. On the first and second days, the disease often instantly vanishes with one asperision ; and sometimes on the third day ; but on the fourth day this is rare. Each asperision however instantly removes the symptoms ; and a few repetitions of it on the successive returns of the paroxysm, in two or three days happily terminate the disease, with none or trifling aid from medicine.

In advanced periods of the disease, the author commonly employs water only 15 or 20 degrees below the natural heat of the human body. After the 8th or 9th day he often simply sponges the whole body with tepid vinegar, to which he sometimes adds water. But where the heat has remained considerable, and where the *sole object* has been its removal, he has still persisted in the tepid asperision. Hence

Hence another limitation occurs to the author's general doctrine; for the cold affusion is to be changed after a certain number of days for the tepid, and the tepid affusion in various cases is to give way after a time to moistening and washing the body.

Since cold, cool, and even tepid water, employed externally, each reduce the patient's heat; we see why this heat should not be too low at the moment, lest too great a chilliness should follow. Hence also the same patient, whose disease has been removed by cold water judiciously applied, would often suffer from repeating the application in his convalescent state. But if we think we perceive why this rude remedy answers so happily at the delicate moment of the hot fit; we are still to enquire, whence it often removes the *whole of the disease*, of which the heat seems to constitute only a part?

Dr. Currie, as might be expected, has extended his trials with water to other species of fever. One species and one alone, he has found in every shape insensible to his great remedy, of aspersion with *cold water*; but this species was generally insensible also to every other remedy, and was *not made worse by cold water*. This fever occurs, he says, chiefly in the winter season; and in persons who are in the flower or vigor of life, and who are also possessed of considerable sensibility of mind, and are in habits of more than ordinary mental exertions. Other particulars of this complaint must be looked for in Dr. Currie; who is the first perhaps who has noticed it, as a distinct species of fever; to which indeed it seems to lay claim, not merely by its refusing to yield to his applications, but by its symptoms; and particularly by the acuteness which prevails in all the senses of the patient, beyond perhaps the state of nature, and certainly beyond what occurs in common fever.

In

In *intermittents*, the cold affusion with vigorous patients, applied *before* the period of the *cold* fit, has prevented the whole of the fit; but where weakness made the attempt hazardous, the cold fit was suffered to arrive and pass, and the affusion was applied to the hot fit when thoroughly formed. The disease was sometimes cured in the first case; but in the second, there was only a solution of the pending fit; though four or five repetitions of the practice finally removed the disease. In any event, opportunity was given for throwing in medicines.

Dr. Currie has found not only that eruptions on the surface of the skin, but that salivation, are no obstacles to the cold affusion, under the restrictions before mentioned.

A friend of his has tried it also in the first commencements of *scarlet fever* (*scarlatina*), and with complete success. The efflorescence on the skin and the affection of the throat were even prevented; which has led Dr. Currie to consider the tendency to these symptoms as being the *effect*, and not the *cause*, of this fever. Dr. Currie having had no late opportunity of treating the scarlet fever in its early stages, has contented himself with prescribing for it in its later stages, immersion in the tepid bath, heated from 92 to 96 degrees of Fahrenheit.

In the eruptive fever of the *small pox*, Dr. Currie has found a new object for the successful use of the cold affusion; regulating himself as usual by the actual state of the patient's heat, as appearing from the thermometer, provided the indications of the thermometer are confirmed by the patient's *sensation* of heat. In the confluent small pox, after the eruption is completely formed, he is diffident of its benefit. But he is the more anxious to apply it in the eruptive fever, since he
says

says that the assimilation of the quantity of contagious matter produced from the first contagion, is invariably found to bear an exact proportion to the eruptive fever. He declares that in the eruptive fever, he has instantly abated the symptoms however severe, and that the disease has assumed a benignant form. He tells us, that the Chinese are stated to have long followed this practice with success. It were to be wished that Dr. Currie had looked into the *Memoires sur les Chinois*, in 4to. published at Paris, under the patronage of M. Bertin, from the papers of the French missionaries; in order to notice a very malignant species of small pox at Pekin, which baffled (as is there said) all common treatment, even that of inoculation; and which perhaps was in truth the small pox complicated with some other disease, or with some peculiar habit of body then prevalent in Pekin.

Dr. Currie treats of *cold water applied internally* in fevers. He says that in the cold stage, it is never to be employed, however urgent the thirst; which ought only to be gratified in this stage of the fit, or paroxysm, with warm liquids. When the hot stage is fairly formed, and the surface of the body *dry and burning*; cold water, he says, may be drank with the utmost freedom; and if it succeeds in lowering the pulse and heat, as is usual, perspiration and sleep commonly follow. Its effect however is never so powerful, according to his experience, as to dissolve even the existing fit of the fever, and much less the fever itself. But he holds draughts of cold water as an useful auxiliary in these cases, and says that they may be used more freely in proportion as the heat is more advanced above the natural standard. He allows cold water to be drank, tho' more sparingly, even in the *beginning* of the sweating stage; since it may promote the flow of perspiration; which
after

after it has commenced, seems to be checked, if a fresh *increase* of animal heat occurs. But after the perspiration has become general and profuse, the use of cold drink is strictly forbidden; the rule being, in all other respects, the same as laid down for cold water used externally.

In case of *injury from drinking cold water*, the author recommends hot water to be applied in a bladder to the pit of the stomach; and small and frequent doses of tincture of opium to be administered, which Dr. Rush recommends in cases of injury from cold water drank in warm weather.

Though Dr. Currie is persuaded that injury has sometimes followed from cold water drank in hot weather and from cold bathing used after strong exercise; yet he denies that any inconvenience is *necessarily* to follow. He affirms, that inconvenience arises only from the want of making proper distinctions. In situations where the body, after having been much heated and enfeebled by severe exertions, is losing its surplus heat by perspiration, and in general by a cessation of the exertions which caused the heat; he allows that cold water, whether applied inwardly or outwardly, may often be injurious and sometimes even fatal. But while the surplus heat is kept up by a continuance of the exertion, he says that cold water may be drank safely in moderate quantities. The same he asserts respecting the cold bath; and therefore he has for some years constantly directed infirm persons to use such a degree of exercise before plunging into the cold bath, as would produce some increased action of the vascular system, with some increase of heat; and thus secure reaction under the shock. It will appear, however, that the patient here ought not to perspire; or if perspiring, ought not to stand still, either dressed or undressed, sufficiently.

ciently long to become chilled from the effect of the act of perspiration, or from the evaporation following it.

Under the above persuasions our author contends against Dr. Rush; that where the party is warm, *no* attempt should be used to reduce the heat, previous to drinking cold water. It follows however from Dr. Currie's own premises, that no objection occurs either against removing the chill from the water, by means of the sun, of common fire, or of animal heat; or against continuing the exercise for a short time after the draught: and as either of these expedients are simple, it would be well to employ one or both of them; as the sole object in view is quenching the thirst, and not curing a disease upon speculative principles. We may here also observe the benefit of wearing cotton or even woollen next to the skin, where perspiration is probable from hot weather or violent exercise, especially where both are combined; since wet linen aided by evaporation, conducts away the heat of the body so rapidly, in certain situations, as often to occasion severe chills. Few however are the cases, in which it will not be safe and highly adviseable to throw off the wet linen, rub or wipe from the skin the matter perspired with something dry, and put on a fresh and dry covering next to the body; as those who have had experience in the case, will cheerfully testify.

As to using the cold bath when the body is warm, there are so many facts on both sides of the question that it requires an expedient to reconcile them; and this Dr. Currie certainly seems to offer. By his means, we perceive whence the Roman youth could plunge in the *course of their daily exercises* into the river Tyber, and yet Alexander suffer from throwing himself into the river Cydnus, after being fatigued and chilled with perspiration;

perspiration; as well as whence the Russians and others jump from a vapour or hot bath into the snow or into a cold bath; while merely to sit in a cold stream of air after violent exercise, is sufficient to bring others, nay the very same people, to the grave. A number of other seemingly contradictory, and yet authentic relations, receive here also a similar solution. Hence we may assure ourselves, that if the waters of the Mississippi never injure those who drink them in summer, whatever be their state as to perspiration or fatigue; it is not owing to the *quality* of these waters, but to their *warmth*, in consequence of their long exposure to the sun. In like manner, if the water issuing newly from the ground in Abyssinia, is harmless in all cases; it is because the spring-water of that country (which every where nearly corresponds with the average temperature of the weather of the place) is never very cold.

But we pass on to new cases of disease.

Before and since the year 1790, the author has witnessed thirteen cases of tetanus (that is, stiffness accompanied at intervals with convulsion, as instanced in the disease known by the name of the locked jaw.) This disease is distinguished into the proper or primary, called idiopathic; and the concomitant or secondary, called symptomatic, being an occasional attendant upon wounds, especially in hot countries. The author from his later experience, is disinclined to use the cold bath in any of its forms in the *symptomatic* tetanus; unless in the earlier stages of the disease, when the vigor is less impaired, and the disease less rooted. One reason is, that change of posture is required for the purpose, in a case where the mere action of the will on the muscles is often alone sufficient to bring on a general convulsion. He rather prefers wine given in large quantities, a remedy first introduced by Dr. Rush; but wishes it *combined*

bined with very large doses of opium. Wine, it seems, has in this disorder been given with success also to horses; but it is queried, whether other strong or spirituous liquors would not answer as well. It is observed that the constitution under this disease, powerfully resists the intoxicating quality of the wine and opium. In tetanus also, Dr. Currie has applied pressure, with evident good effect; moistening at the same time the bandages with ether, but taking care lest inconvenience should arise from too great an evaporation, the natural consequence of ether being exposed to a current of air. In the *idiopathic* or simple tetanus, the author has applied water of an exceedingly cold temperature (exhibited in a bath where the effect was sudden and the limbs could be stretched out,) with a very marked success, though all other applications had failed. Let us observe here, that since to rub in sweet oil has been found a powerful remedy with many, in cases of *cramp* of the external muscles; it might be well always to try it in tetanus, though medical persons often slight it. In any event, those subject to this painful affection of the cramp, especially pregnant women and swimmers, may do well to remember this use of oil. Oily substances may also be tried by the mouth or clyster, in cases of cramp or spasm in the stomach or intestines.

The author has applied a very cold bath to more than one case of insanity, with brilliant success; but it was when the fit was at the highest. The ordinary delirium of fever is acted upon by cold water in different shapes, in common with all the other symptoms of fever.

In children's convulsions, it is also serviceable; stopping the fit, and giving time for other remedies. When the author mentions that convulsions may sometimes arise from worms or other causes; perhaps he
 ought

ought to have added, that teething is one of these causes, and that John Hunter has given instant relief, by cutting the gum over a young tooth with a lancet. On the whole, Dr. Currie recommends caution in the applications of water in early infancy; sometimes tempering his water, and sometimes only pouring it on, in preference to bathing in it; but making the operation sudden and transient and providing means ready for securing the re-action, and even omitting it altogether when little vigor is left. But with these precautions he has seen great benefit resulting from the application of cold water.

In cases of St. Vitus's dance he has found no encouragement, for a reason hereafter to be mentioned; but he recommends electricity in this complaint, as one of the few in which this operation seems advantageous.

He promises us little from his remedy in the case of epilepsy, where his experience does not seem indeed to have been extensive. Instead however of his own favorite remedy, he mentions benefit derived, in a case of periodical epilepsy, from a plaister formed chiefly of tobacco, applied near the pit of the stomach before the expected attack. He has used tobacco also in two desperate cases of convulsion, followed by continued coma (that is, sleepiness and loss of sense;) but it was in the form of a decoction applied, as a clyster, which he prefers to the fumes of tobacco; the quantity for the decoction being half a drachm of tobacco in four ounces of water. In epilepsy also he applies oxyd of zinc (that is the calx of the semi-metal zinc;) and still more efficaciously the *digitalis purpurea*, or purple fox-glove, concerning which Dr. Withering and others have lately written largely. The author might have added, that hartshorn or ether mixed with water and given during the epileptic fit, tend powerfully to shorten it.

But

But let us close the author's account of his treatment of convulsive diseases with the following general remarks, extracted from his work. The efficacy of the cold bath in convulsive disorders, is much promoted by its being employed *during the moment of convulsion*; or (as he afterwards chooses to express himself,) its chief benefit depends on its being used in the paroxysm of convulsion; its efficacy consisting in resolving or abating this paroxysm, by which means the return is greatly retarded, if not entirely prevented. This law or principle in the disease, the author tells us, bears analogy to the fact, that madness is best treated in the height of phrenzy. He also remarks, that the cold bath seems without effect in any spasmodic disorder (as St. Vitus's dance,) which does not rise to the height of convulsion. Lastly, he observes that in cases of madness and convulsion, there must be no considerable wound or other lesion of structure; that the disease should not be too habitual, and especially so as to produce insensibility to impression; that the fit should have a *general influence on the frame*; and that the digestion should not be too much impaired nor the vigor of the circulation much debilitated, lest the action of the cold be too strong for the living powers.

‘ Cold water (says our author) cannot be used as a *drink* during the paroxysm of *convulsions*; and of course we cannot shew the analogy between its external and internal use in these, as in other diseases.

‘ That its effects (he adds) taken internally, are most salutary, in a numerous class of *chronic* diseases, is however well known; though perhaps not acknowledged to the full extent of the truth. A considerable part of the virtue of mineral waters is doubtless to be attributed either to the diluting quality of the pure element itself; or to the invigorating effect of cold

‘ on

‘on the stomach, and through it, on the system at large. * * * In hypochondriacal, hysterical and dyspeptic* affections, cold water taken internally has produced the most salutary effects. Hoffman praises it in head-ach, whether arising from indigestion or some primary affection of the nerves of the head. The following case will shew the use of cold drink in certain convulsive affections.’ Here the author cites from Hoffman the case of a Jew boy, cured of violent convulsions in a fortnight, by drinking cold water frequently every day.

Dr. Currie applies the term *tepid*, to water heated from 87 to 97 degrees of Fahrenheit, where it is used for affusion; though water will seem to be warm to the body at some degrees lower, if used as a bath, for in this case the evaporation is excluded. The cold from evaporation is so considerable, that water in the warmest climates will chill the person moistened with it, if standing in a current of air in the shade.

The author finds the coolness remaining from the *warm* affusion (strange as it may be thought) as great, as that from the cold affusion; and perhaps greater; but the cold is less sudden and stimulating. Without inquiring into the author’s reasonings, let us observe that he applies the tepid affusion to certain other cases where there is fever; provided the chief view is to diminish the heat, and provided there is no contagion present, nor any foul matter in the bowels, as likewise no local inflammation; for we must never forget that affusion is only recommended where the heat is *general*. Under these impressions, the author employs the warm affusion frequently with children; and he has used it also where the

**Dyspepsia, in general includes the obvious diseases arising from indigestion.*

the lungs were affected ; and especially in his *own* case, during the hectic fit, in hereditary consumption. But independent of the possibility of the respiration being affected, he remarks that in hectic cases, the body soon parts with its heat, which is then seldom great, even in the extremities. He recommends, however, in any event to moisten the inside of the hands and feet ; since from the sensation of heat in the extremities, great irritation follows to the system.

Dr. Currie every where insists, that when the patient feels chilly, neither affusions nor wet sponges, of any kind, are to be applied : but he repeats, that the cold affusion (which he calls an *energetic* remedy) is not only the most effectual, but *safest* application, in many of the cases where it can be used ; since the system often accommodates itself to a sudden cold which is general and stimulating, but shrinks from a cold which is slow and successive.

Water tempered from 75 to 87 degrees, (which the author terms *cool*) is recommended for febrile diseases ; but more frequently for palsy and other cases of debility. If the system is to be strengthened, or if diseased associations (or habits) are to be broken through, the application is to be quick and brief ; but if it is merely to allay heat and there is no danger of indirectly affecting the respiration, it may be used more slowly.

Such are the principal uses of water here to be mentioned from Dr. Currie.—We may be permitted to add one or two to his list. In cases of strains, dislocations, or fractures, *cold water* employed externally has had the happiest effects : operating in the first case like a charm ; and in the others, allaying inflammation and preventing swelling, till the arrival of the surgeon, who then finds less impediment in examining the bones. With bruises and burns, similar advantages perhaps may be expected.

ed. But in all cases, it must be remembered, that the application must be *immediate* and long continued, and used merely to the part affected; and the water be changed whenever, notwithstanding a variation in the position, the cold goes off.

Electricity has similar good effects with cold water in strains and burns; and might be useful possibly in the other cases here referred to, if applied with equal speed; but this can seldom happen. Yet it is in some cases perhaps an application less disagreeable than cold water, which is often attended with pain in cases where it is most effectual.

As sea-bathing has become universal in England, (especially for scrofulous complaints) we add to our author's remarks, that *washing* the whole body with sea-salt and common water, made of a strength sufficient to support a new-laid egg, is commonly found to be an excellent substitute; and perhaps in some cases this proportion of salt might be increased. If the complaint is local, then a salt poultice is also applied to the part; that is, moistened salt is kept close to the part by enclosing it in wet rags, or by any other similar contrivance. The expence and inconvenience of resorting to the sea is hence often removed. The salt poultice has many other uses; as for example in the mumps, a disorder consisting of a painful swelling in the cheek and round the jaw, which commonly it easily removes.

Various.

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Various individuals and nations have possessed detached practices conformed to Dr. Currie's system; practices however, which were little extended, and which finally have often been forgotten. Accident alone, it is true, would formerly, as now, have shewn the use of these practices, even in fevers and other diseases equally critical; as where delirium led a patient to plunge into cold water, or where an impetuous sick man indulged himself in cold drink, each at fortunate moments. Physicians also, as well as the vulgar, would often seek to counteract certain symptoms in diseases by their contraries, or follow nature in its other indications. But mischief in some cases arising from want of due discriminations, these hints from nature, though confirmed by experience, would frequently be abandoned for modes of cure more mysterious, and therefore better suited to the crafty physician and to the prejudices of the people. This would be the more natural in diseases which, like fever, commonly pass through the stage of cold to arrive at that of heat, and which seem to be relieved by critical sweatings resulting apparently from heat; especially as these diseases in many cases seem even to originate from cold. But as in other pursuits, so it happens in medicine; that men, after quitting one extreme in order to try another, often ultimately find not only all the evil, but all the good inherent to each; and thence discover the happy medium consisting of the good of each, abstracted from its evil. To this fortunate point perhaps, we are proceeding in the case of fever and some other diseases; and in no small degree, as it seems, by the help of Dr. Currie's distinctions, which ultimately form the chief value of his work; for his practices in general are in themselves

themselves familiar, the great question being where and how to apply them.

In various eastern countries, we find cold water used as an instrument in medicine ; the custom probably being derived to them from ancient times. Dr. Currie not only cites the example of the Chinese, but of others ; and he especially refers to the treatment of the sickness of Sir John Chardin in Persia ; and Dampier says,* that he himself was cured of a flux, by bathing daily in a river in some of the eastern parts of Asia. But it is not from the rude practice of the orientals, nor even from Hippocrates or Galen, who each employed cold water medicinally ; that we are to expect nice distinctions in these cases. Such do not in general offer themselves suddenly even in our own times.

Dr. Wright made his experiment in 1777, and (as every physician ought to do where he has the opportunity) he made it upon himself. He has great merit ; but that merit does not consist in having given us *sufficient rules*. In 1788, a part of the practice in question was established in the Liverpool infirmary ; whence it spread into the town of Liverpool and its surrounding county. In 1791, Dr. Currie's colleague published an account of these methods in Dr. Duncan's medical commentaries for that year. Dr. Currie himself published another partial account in 1792. Dr. Gregory (the younger) of Edinburgh has spoken on the subject in his public lectures ; and even in 1737 it was used in a vague manner in Silesia, though it is now probably neglected there. Various practitioners also have resorted to cold water in the West-Indies, and some likewise in the United States. But as the practice has not gained

* This fact is stated upon memory only.

gained ground generally, and chiefly for want of the rules necessary to prevent mistakes, especially in the case of fever; we have sufficient proof of our obligations to Dr. Currie. What thanks would not be due to him, who should teach with certainty when to employ and when to avoid *blood-letting*; and especially should he give so accurate a guide as a thermometer and the feelings of the patient as to heat, when confirming each other?*

The thermometer indeed cannot always be used by the country practitioner, to whom we shall soon suggest a substitute; but to others, who can more easily obtain this useful assistant, we address the following information.

Mr. John Hunter, in the London Philosophical Transactions for 1778 (see also those for 1779) describes a thermometer of his own invention and of Mr. Ramsden's

* This was written before seeing Dr. Rush's late brief and simple rules for blood-letting.

The members of the three learned professions in America, notwithstanding the worth and well known talents of many among them, have long been liable to the reproach, of having contributed little to the progress of their respective sciences, by means of their publications. The American professors of medicine have lately relieved themselves from this charge, by some valuable works. Among the earliest of these authors we must certainly place the amiable and respectable Dr. Rush, who has so eminently contributed to excite an emulation among the medical students in his own state. Professor Mitchell, and others have most happily introduced a like emulation into the state of Newyork; which it is hoped will soon spread itself.

den's workmanship ; which was short, slender, and with so small a bulb, that he could upon occasion put the whole into a peacock's quill ; even including the scale, which was moveable* and of transparent ivory, being in the form of a hollow tube and no were touching the bulb. The results of this thermometer, differed from those of others before used by John Hunter, and even from his own expectations. It was this sort of thermometer which Dr. Currie employed with his patients ; taking care to make the stem bend backwards in order to admit of his standing behind the sick, to avoid infection from their breath. Dr. Currie recommends as a farther improvement to add a guage like that used by Mr. Six, in his thermometers made upon the plan of those invented by Lord C. Cavendish. (See London Phil: Trans: for 1782 and 1757.) But a thermometer with spirits of wine (which sufficiently corresponds with one of mercury in the high temperatures here in question) would probably be visible enough to answer every purpose, were the spirits as is usual, *colored* ; and it does not appear, why excessive diminutiveness is so necessary a quality in mere medical thermometers.

We have hinted that country practitioners must often be content, and may do sufficiently well, without thermometers ; and especially in these parts of the United States, where thermometers are so seldom found corresponding with each other ; and where, even if good, they are with difficulty replaced in case of accidents. The uses of the thermometer in Dr. Currie's system of practice

* *A moveable scale admits the application of the naked thermometer in certain cases ; and the observer by a mark on its tube, is easily enabled when the scale is afterwards restored to its place, to ascertain where the mercury has stood during his experiments.*

practice are chiefly two ; one to shew the heat of the patient, and the other the temperature of the water to be applied to him.

Let us begin with the latter subject. It is known to every practitioner, that boiling water is always of the same heat in the same state of the atmosphere. Next, it will soon be shewn, that water can always easily be found at hand at certain other known degrees of temperature. Lastly, rules may be given, for producing *any intermediate temperature* between that of boiling water and of water of any other known temperature, *merely by mixing them in certain proportions and with certain precautions.*

We shall now shew that water may generally be found of several temperatures, which are easily ascertained without the aid of thermometers. 1° In winter, water which has remained a certain time filled with ice or pounded snow, after it is poured off, will stand at the freezing point ; or at 32 degrees of Fahrenheit's thermometer. Water will also stand at the freezing point ; when taken from underneath a surface of thick ice, formed upon it in winter in a vessel of moderate size.* 2° The average temperature of the air throughout the year may be known for any place ; and this temperature is one and the same with that of the springs of the place when first issuing from the ground, and also of the earth of the place at a few feet below the surface. 3° The average temperature of each month also may easily be known for any place ; and when known, it will commonly nearly mark the temperature of the water accidentally found in any considerable vessel, placed under shelter from the wind and sun, but exposed to the

* Mr. Nairne, instrument maker at London, first noted his fact, in itself so evident.

the open air ; especially upon making certain obvious allowances.

We stop for a few remarks. 1^o The average temperature of the air in any place is found with great trouble, by the common method, of observing the thermometer two or three times in every day, throughout several years ; but whoever in the neighborhood of Salem, wishes for such observations, cannot do better than refer to those by Dr. Holyoke ; who gives in this manner the temperature of each month, as well as of the whole year : (See the Boston Philosophical Transactions. Vol. 2.) But perhaps the following method with a little management may equally answer. Take a large and tight cask with wooden hoops, and pitch or varnish its outside in order to keep it from moisture ; fill it with dry earth ; place it firmly on its *side* above the ground, with a thermometer in it, which shall reach to its middle and still leave enough of the stem on the outside, for observing the changes, the bulb being large ; and keep the whole sheltered from the sun, wind, rain and snow. This cask will never shew the temperature of any one day ; but only the average of a number of days, reckoning *backwards* from the day of the observation. The larger is its size, the greater is the number of days whose temperature it will include ; also the slower will be its variations ; and consequently, *the less frequently need it be consulted*, in order to collect from it the average temperature of the seasons and of the year. Though it must always be reckoned backwards, yet in this it agrees with the masses of water whose temperature we may wish to learn.—2^o It may here also be useful to observe ; that in this climate, from December to February inclusive, there is no very important variation in the average temperature of the months ; and as little from June to August inclusive ; but in the other months,

months, taking an average of seven years, each month differs from its neighbors from 8 to 12 degrees of the thermometer.—3^o Wells are less steady in their temperature than close pumps, especially if the last are much used; nor are cellars or caves more constant than wells. But wells and caves vary least in summer; because the air in them, being then cooler and heavier than that of the atmosphere, remains for a considerable time unchanged; whereas, during the rest of the year, it is often changed for heavier air from the atmosphere. Good cellars are more uniform in winter, because then shut up. But water buried for a time four or five feet under ground, will soon come to the average of the temperature of the place.

Having thus spoken of fixed points of temperature at which water may be found, it may be expected that we should give rules, according to which waters of certain temperatures may be mixed with boiling water; in order to produce intermediate temperatures. It would be possible to refer to authors on this subject; particularly to Dr. Crawford's work on animal heat, 2d edition; but it is believed, that nothing of this kind has been done in a form sufficiently popular. Some benevolent person is therefore called upon, who is more favorably circumstanced respecting thermometers and books than is the writer of this; to make the necessary experiments, and publish in our newspapers the necessary rules, that this branch of practical knowledge may no longer be neglected.—Precautions must be added, as to the vessels holding the water, whether cold, boiling, or mixed; and also for placing the boiling water lowest in the vessel when about to be mixed, and then stirring it immediately along with the cold water, with other circumstances which will naturally present themselves.

Enough.

Enough then has been said as to the fixed points of heat at which water may be found and the methods by which it may be tempered by being mixed in different proportions at different temperatures, for the purpose of bathing, aspersing, or moistening the bodies of different patients according to their respective cases. Happily very great nicety is not found to be requisite; and perhaps the guess of the practitioner will always abundantly suffice. In this case, what has been said on these subjects will not be lost, since it will find its place with those attentive to *meteorology* and other branches of natural philosophy.

As to calculating the patient's heat, without help from a thermometer, in general, we may depend on the patient's feelings, the rapidity of the pulse, the precedence of the cold stage of fever, the color of the skin, its freedom from perspiration, the fulness of the face, and the marks of *universal* heat to the touch of the observer. That the practitioner may not be misled by the remains of heat which the bed clothes may have kept in the patient from a preceding hot fit; let the bed clothes be thinned with judgment and for a short time; and if the patient still remains hot, he will offer a new criterion as to his temperature. If other rules are wanting, the following are some which present themselves.

Take a short tube of glass, exceedingly thin and with a very small bore, having one end open and the other closed. Having first heated it gradually by placing its *outside* in heated water, plunge its open mouth into a small quantity of spirits colored with cochineal, or of aqua-fortis made blue by vitriol or copper; or if quicksilver is at hand, put it into a little quicksilver. As the air cools in the tube, fluid will rise into it; and when a very short column (amounting only to a drop.

or two) has been taken up, we have an instrument suited to our purpose.—A cork may be placed in the open end, when this instrument is not in use, to prevent dirt entering, or the evaporation of the spirit or water; but the cork must be carefully withdrawn, to preserve the connection with the atmosphere, when the instrument is employed. Let the practitioner place it during some time under his arm-pit, when at the sick bed; and, marking the spot then occupied by the column or fluid, let him wipe the instrument, and place it under the arm-pit of his patient. If the patient's heat be *greater* than his own, the air behind the column of fluid confined by the closed end of the tube, will now be most rarified, and drive the fluid farther out than with himself; if the contrary, the reverse will happen. This instrument must at some one time be compared with a thermometer, merely to shew how its scale of variation agrees with that of the thermometer, unless this can be guessed at by other methods. But the degree in which an instrument of this sort will be affected by the changes in the weight of the atmosphere, (for it is a species of barometer) render it necessary that the comparison of it with the heat of a healthy person, should always take place. An object to be farther attended to is, that the patient's heat be not only greater than natural, but at a high pitch even for *fever* heat.

Perhaps chemists may invent some compositions, which by their melting or effervescence may indicate fixed degrees of heat, which may be contrived to serve as standards for the heat of fever.

With respect to the standard heat of the human subject taken *internally* in a *state of health*; it varies with age, constitution, exercise, fulness from meals, and other circumstances, independent of disease. The usual average temperature is perhaps at 97; but eating for example,

example, increases it one or more degrees. In disease, according to Dr. Currie's observations, it sometimes in extraordinary cases, sinks as low as 92; and sometimes in cases equally extraordinary, it rises to 105. Repeated doses of the *purple fox-glove* have reduced the heat to 89, and the pulse to 32 in the minute. Dr. Currie constantly treats the heat under the tongue when the mouth is shut, and the heat under the armpit when the body is properly covered, as one and the same; and takes them for his standard of the internal heat. The experiments of John Hunter, Dr. Crawford, and others, upon animals whose bodies have been opened during life, prove that the heat within, near the heart and lungs, is greater than in the other parts of the body. But it is needless to repeat these cruel experiments, which can offer no guide with patients; the stations assigned by Dr. Currie for receiving the instruments to measure the internal heat, answering every purpose in the cases here in view.

Dr. Currie says, in a note; 'I intended to have introduced one or two registers of the heat and pulse, taken every half hour, during the paroxysm of intermittent; but this is delayed, till I am enabled to speak from more numerous observations.' Dr. Currie, it is to be hoped, will feel himself bound to fulfil this task. If these lines should chance to meet his notice he is requested by one who respects his benevolent zeal, as well as his abilities, to extend his views; and to favor us with a more accurate account of the internal heat of the human subject in all cases referred to in the preceding paragraph, short of *living* dissections.

To encourage him or others to labors of this kind (which are best pursued in large towns, particularly if possessed, as they are generally, of infirmaries;) we may be allowed to state something concerning the
 standard

standard rate of the *pulse* in the human subject. The pulse offers an important criterion in fever; and the pulse of persons under given circumstances, when in health, furnishes a necessary point of comparison for the pulse of the *same* class of persons during *disease*. We shall follow in this, the good Dr. William Heberden; observing that he speaks of the pulse as it is found in England*.

Rates of the beats of the pulse in the human subject, during the course of one minute.

Dur- ing Sleep.	{ On the day of birth,	130 to 140 ;
	{ Through the first month,	108 to 140 ;
	{ Thence, during the first year,	108 to 120 ;
	{ Through the second year,	90 to 100 ;
	Thence to the sixth year, decreasing,	80 to 108 ;
	During the seventh year,	72 and upwards ;
	Thence to the twelfth year,	70 and upwards.

N. B. The pulse up to this age is more easily quickened by illness than afterwards.

Afterwards the pulse is from 60 to 80 ; but in men, it sometimes goes to 90, and in women even beyond 90. Sometimes the pulse is below 40. It frequently likewise intermits.

After a full meal the pulse increases ten or twelve beats. But if it has ten pulsations beyond the natural rate of the patient's pulse, viewed as varying according to accidental circumstances ; it indicates disorder.

In *disorder* during the first year, the rate may pass from 140 to 160 ; but want of sleep and appetite, with thirst and the state of the infant's breathing, are here better indications. Sometimes

* See *Medical Transactions published by the College of Physicians in London, Vol. 20.*

Sometimes 144 is a rate fatal at two years ; but with others, 156 and 152, are not fatal rates, at the ages of 4 and 9 respectively.

With children a reduction of 15 or 20 beats of the pulse, accompanied with signs of considerable illness, mark an affection of the brain. With adults, a sudden abatement of pulse in fever, and an aggravation of other symptoms, equally indicate disease in this organ.

With adults, 100 beats denote commonly no evident danger ; but danger begins at 120, and unless there be delirium, all beyond is commonly fatal. The author excepts cases of acute rheumatism and cases previous to a deposit of matter ; when there have been recoveries even at 150 and 120 respectively. He excepts also cases of *low fever* at 90 or 100 ; for here may still be danger.

It is hard to count 140 beats, unless distinct ; but where distinct we may count 180 in a minute.

Schirrous and ulcerous cases, with a hectic, are often for a long time from 90 to 120.

Great pain in certain cases, does not quicken the pulse ; as is instanced with gall-stones.

It must not be forgotten in disease, as well as in health, that women sometimes have quicker pulses than men, other things being equal.

Thus far we collect from Dr. Heberden.

A practitioner wishing to pursue observations of this kind, may not always be provided with a watch beating seconds ; and, in these parts of the United States, he cannot always be certain of access even to a pendulum clock. It may therefore be convenient to know, that in these latitudes, a pendulum bearing seconds, may be made of a *very fine* thread and a *small* leaden ball ; extending in the *whole* about 39 inches and two tenths ; from the point of suspension ; which point we will suppose formed by a very strong dressing pin. Theoretically,

cally, a pendulum should be somewhat shorter in these latitudes; but the above total length will answer for practice with a pendulum of the above description. The habits of astronomers shew, that it is easy to learn to count seconds by memory. The practitioner who is able to do this, may, in certain cases, station one upon whom he can depend, to note the pulsations which have occurred in a patient, while he has been counting apart a certain number of seconds. It can be of no disservice also for a patient to learn the ordinary rates of his own pulse, to tell to his physician in case of disease.

With respect to other indications of the pulse, in which not only certain individuals, but certain nations pretend to a peculiar nicety, we refer to the various authors who have written more or less expressly on the subject.

We do not follow Dr. Currie in his *history* of the theory of fever. We rather give his *own* account of the leading *symptoms of this affection*, when viewed independent of circumstances and under general characters, in order to accompany it with his remarks.

Fever begins with a languor of a *peculiar* kind seen even in the countenance, and is followed by paleness, cold, and trembling, and (he should have added here) by a shrinking of the surface of the body; the action of the mind and of the whole system being enfeebled. The heart and lungs, being roused by the fluids now crowding inwards, soon press them outwards. A tightness or spasm however in the vessels at the surface opposing, the internal re-action becomes increased. If in the struggle, the stomach becomes affected by sympathy, a tendency to sickness ensues. At last, the powers of life prevailing, heat appears, first in one part of the surface and then in another, but with some fluctuation; till the hot stage becomes universal, when the vessels on the surface

surface finally yield a passage to perspiration, though not always without a check. Such is the course of a single fever fit, when it obtains a regular termination. But in cases of *continued* fever, both the spasm and heat remain longer ; till at length as the patient weakens, the spasm decreases so as to admit of perspiration, and the heat is sometimes brought almost to its natural state ; the quickness of the pulse alone persisting, as the *effect of a habit* produced in the course of the disease. Thus he says, when a hot room or bath raises the heat in the human subject 4 or 5 degrees, and most of the other symptoms of fever appear ; yet after the external heat is removed and the internal heat becomes natural, the increased pulse still continues ; which he attributes to the principle of association, peculiar to life and pervading the vital phenomena intellectual and corporeal. The author from the same case of artificial heat proves the existence of *spasm* ; since perspiration follows this heat so plentifully, as to make it difficult to increase the internal heat beyond 100 or 101 ; whereas at the same temperature in fever, perspiration is often refused. He observes also, that both in hot fever and in the sudden increase of heat in health, the tightness of the vessels at the surface often exists ; but when the heat abates, it disappears so as to admit of perspiration ; the spasm in the case of health being the result of a resistance to a violent stimulus. This resistance he calls another law of the living system, belonging to every species of vital action whether of mind or of body.

In these circumstances, he conceives that the general and powerful spur or stimulus of cold water dissolves the spasm or tightness ; perspiration and evaporation now succeeding, which naturally tend to reduce the heat and pulse. Whether the cold as a new stimulus *aids* the stimulus already existing in the blood vessels ;

or whether the cold acts by dispelling or by *counterbalancing* the spasm on the surface; or whether these causes stand more less combined; will not here be disputed. Certain it is, that the *cold* of the water operates more than its *moisture*; because warm water in general less easily effects a cure, even when producing a greater coolness through its longer application; though it is possessed of those additional chemical powers for dissolving or penetrating substances which are derived from heat. On the other hand, even sudden cold reduces the animal heat, chiefly by affecting the body as consisting of organized living matter. Hence a variation in the effects, both temporary and permanent, of the cold and other affusions, &c. whether we compare these effects with themselves or with each other, in cases similar in a mere mechanical view.

As to the diminution of *thirst* following the cold affusion on the surface, Dr. Currie by no means admits that much water is ever absorbed by the skin; and therefore attributes this diminution of thirst to the removal of a spasm in the mouth, jaws, and stomach. Whether it be the removal of spasm or something else which is effected within, will not be discussed: it suffices, that a *sympathy obtains between all these parts*. It is no less true, that thirst is allayed by a draught of fluid before it can have entered the circulation; as likewise, that perspiration often as immediately follows.

The author (as has been hinted) attributes the reduction of heat by the tepid affusion, to cold arising from evaporation; but as this stimulus is always slight and necessarily transient, the heat ultimately returns and the effect becomes merely palliative. Even the cold affusion cures at once, only in the early stages of disease; and though uniformly advantageous while the morbid

morbid *heat* continues, its effects are less decisive when morbid associations have once been produced.

What then, says Dr. Currie, ought to be the *indications in the cure of fever*? To diminish the cold in the cold stage; to moderate the heat in the hot stage; to resolve the tightness or spasm on the extreme vessels; and, where the inordinate action of the vascular system still continues, to support the powers of life, till the diseased associations die away from the ceasing of their causes. It is also essential, to secure the proper action of the bowels; and, in every case, to unload them of their morbid contents, whether these are the effect or the cause of the disease.

It is a serious error, according to Dr. Currie, to suppose that febrile poison received into the system, is the principal cause of the *symptoms* of fever; and that these symptoms consist in a struggle of nature to expel the poison. It is safer to consider the poison, as an agent that *excites the system into fever*; the fever being afterwards carried on, not by the agency of this poison, but of the principles which regulate the actions of life. We are not therefore to wait for a restorative process, by which nature is conceived to throw off the poison; but to oppose the fever in every stage with all our skill, and bring it to as speedy a termination as is possible. By the powerful means of the cold affusion applied in time, the whole of the feverish symptoms vanish. Hence the safety and wisdom of decisive measures before the strength is materially impaired or diseased habits established.

Those who practice within the *tropics*, where fever runs its dreadful course with such rapidity, ought especially, he says, to be aware of this truth. They ought also to combat the disease not merely by cold affusions,

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(which whether supplied by springs or by the sea, can seldom there be below the temperature of 77 or 78;) but by actual immersion of the patient in a bath, or in the sea, supposing this at hand. The duration of the immersion he thinks must be governed by the pulse, by the sensations of the patient, and by the thermometer. He refers for the success of this practice to the case of Sir John Chardin; and to that of persons, who in the delirium of fever and chiefly in warm climates, have plunged into the sea, and who in every instance within his knowledge (where they have been saved from drowning) have recovered. To increase the cold of water in hot climates, he refers to the well-known artificial modes of cooling water. He also hints at the practice of alternately plunging the patient in water and then raising him into the air, where the wind blows over his naked body, farther to cool it; but he says that the utmost care is necessary to guard against fatigue; and we venture to add, that it will be prudent to have means at hand to remove both chilliness and faintness, should either occur. In the northern and middle latitudes of the United States, the effects of cold winters upon springs, furnishes cold water at all times; and ice-houses admit of rendering it still colder.

In hot climates, to cold water for the surface, the author would add cold *drink* in large quantities, where the patient's heat will bear it, especially the heat within at the stomach; and he considers a tendency to vomit as no objection. He confirms his opinion by the practice of the ancients, by the treatment used in the Hungarian fever (which he holds as resembling the yellow fever), and by the recommendations of Hoffman in bilious vomitings and dysentery.

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We now proceed to glean a few other *detached particulars* from the author's work, which are either theoretical or conjectural; or have no immediate relation to the use of water; or have not before been sufficiently noticed.

The author wishes both cold water and cold drink to be tried in the case of the *plague*, should the heat in that disease be considerable; but if it is no greater than in the confluent small pox, which is little, if at all above the natural standard, he has little hope.

The best explanation which he can give of the success of his favorite remedy, in *convulsive diseases and in insanity*, if applied at the moment of their *height*, is taken from John Hunter and Dr. Darwin; namely, that no *two* great actions seem to take place in the human constitution at the same time; and that if the balance of vital energy can be turned in favor of a shock from cold, it will supersede the disposition to the diseases in question at their critical moments, and thus break through their associations. Tobacco used in the *crisis* of epilepsy, is another instance with him of the benefit of employing, in these cases, the balance of power in one stimulus over that in another. From both these remedies thus respectively applied; the good effect he says, has repeatedly been *permanent*.

In *cooling the surrounding air*, or in any other application of cold, in fever; care must be taken to watch the limits within which it is grateful to the sensations; in which case the author's experience has *uniformly* shewn it to be advantageous.

It is believed that the author somewhere speaks of a wet blanket having been used with success. Dr. Crawford certainly gave temporary relief even from delirium, to a patient in fever, by this means; and nothing

ing but its being used too late, seemed to have made it a palliative rather than an effectual remedy.

The author says, that the action of cold may be conveyed over the whole system by its application to a single part ; as when cold substances are applied to some single part, *to stop bleedings*. Hence, for bleeding from the lungs, he has dipped the feet in cold water ; though he thinks that it might perhaps have been better to have applied cold permanently to the scrotum, &c. ; and he has often here found it safe and efficacious to plunge the patient into cold water up to the hips. In all these instances, the application of cold must be both powerful and permanent.

The same rule as to permanency and degree, is necessary for cold applied *locally* to parts which are *inflamed*. Thus even ice, snow, and the clay-cap, are successfully employed, not only for reducing, but for *preventing* inflammation ; the sensation of cold in the parts acted upon, speedily subsiding.

He does not apply cold to local inflammation, *if attended with fever* ; chiefly, because in such cases there is too great a sensibility to cold and indeed to other stimulants ; but this is a subject which he avoids treating at length.

He extends this objection however to *measles*, *carrhs* (or colds,) &c. and he is not persuaded that cold can be useful in *pluerisy* or *peripneumony*. Yet in inflammations of the *brain*, *stomach*, *intestines*, &c. and especially if desperate, he thinks the cold bath should be hazarded. But *in all inflammatory cases*, he inclines to judge it proper to moderate the cold, if employed. Besides sinking for example, gradually, into the cold bath ; the state of the pulse and of the heat is to be examined ; though the author remarks from his own case, while in health, that the heat within the trunk of the

the body is wonderfully sustained in the cold bath, notwithstanding it is speedily and permanently lessened at the extremities.

The *House of Recovery* instituted in May, 1796, at Manchester in England, affords a singular instance of success in preventing infection throughout a large town; and merits a short abstract from our author. Into this asylum on the first notice of fever, the patient is removed; and proper methods (being in part chemical) are taken to purify his habitation. The prevalence of fever has hence diminished to a degree beyond all rational expectation; and the fears that the institution might spread contagion in its particular neighborhood, are found groundless; since not one case of fever appears there for 10 or 15 cases which prevailed there before. About one in nine only of those admitted, die; and as the result has made considerable impression, it will still farther greatly reduce both the deaths and the danger of contagion, should the poor apply in the *early* stages of the disease. The importance of such an institution, in great towns, may be known from two other facts related by Dr. Currie. First: the apartments for fever-cases, in the Liverpool work-house, are in the very centre of the building, and cannot be entered except through the common stair-case; and yet not a single instance is known of contagion spreading thence, to the other patients in the house. Secondly the number of fever cases annually presented to the medical attendants at the Dispensary at Liverpool (a town with a population resembling that of Philadelphia) is above *three thousand*; and the average duration of the fever is about 14 days, besides 14 days consumed in the recovery, where the recovery happens. The fever-cases, in short, make nearly one fourth of the whole number of maladies; the loss to the public occasioned by which may easily be conceived.

conceived. In Liverpool (and this is another remarkable fact) 1800 cellars are inhabited by about 7000 persons, besides 9000 who live in close and confined houses and many of these persons taste no animal food; tea being generally drank, once, if not twice in the day; from which causes principally and the use of spirits, above 500 patients who are chiefly females, are annually found among those applying to the dispensary on account of *diseased digestion*.

When our author however in speaking of the above institutions, affirms with Dr. William Heberden, that cold winters are unhealthy in England; and states that the most unhealthy moment is that when they are exchanged for warmer weather; an inhabitant of these northern parts of the United States cannot but indulge a smile. Perhaps in no part of the civilized western world, is the entire severity of a cold winter *actually* more fully braved, than in these parts; nor can a more sudden transition from heat to cold easily offer; and yet *in no one country in the known world*, is there less of disease, or fewer deaths, upon a given number of inhabitants. This fact, and especially in a comparative view, merits a particular attention, which will perhaps be given to it on a future occasion.

The common treatment of fever by the gentlemen belonging to the Liverpool dispensary (which is distinct from the infirmary) consists in giving first, antimonial emetics; and then, bark, opium, and wine; nourishing food being occasionally administered; but seldom washing with cold water (which would indeed be difficult in the cellars where this disease is usually found.)

Dr. Currie will now offer some more particular and interesting information on the use of opium and strong liquors in fever. Dr.

Dr. Currie, treats of *opium*, pursuant to the engagement in the title to his work; viewing it as administered in health and in fever.

In a state of *health*, if the mind is vacant and external objects excluded, and provided also that the stomach is empty; opium usually procures sleep. This sleep is preceded by agreeable sensations, happy slumbers, and gentle perspiration; the surface and extremities of the bodies acquiring the same heat with the internal parts. As the full sleep approaches, the pulse quickens, and the breath becomes slightly irregular; but when profound sleep has actually arrived, the pulse abates to its slowest rate; while the breathing, besides growing slow, becomes regular also, and deep.

In *fever*, if the heat reaches or exceeds 100 degrees of the thermometer, with a dry skin; opium commonly seems to add to the heat and restlessness. When the skin has softened, and the heat though still great, is yet subsiding, opium often accelerates the perspiration; and by this means, diminishes the heat; in which case tranquility and sleep generally follow.

Hence, in the case of *continued fever*, which is commonly greatest in the evening, and is then accompanied with two or more additional degrees of heat; an opiate (or anodyne) may injure at night, and yet do service at two or three o'clock in the morning. Hence also in continued fever, it may be proper to lower the temperature of the surface and prepare for perspiration, by cold or tepid affusion or drink, (applied according to rules) before giving, or even after giving, the opium. In *intermittents*, on the other hand, where the disposition to perspire is more easily excited; opium may be given with fewer precautions; though if administered in the hot stage, its salutary effects may be much promoted by moderate draughts of liquids; which should be cold, if the heat is great.

The

The author conceives water to be a better assistant to opium in procuring perspiration, than ipecachuana or antimonials; except in inflammatory diseases and in dysentery. His dose of opium is 2 or 3 grains of the extract, or from 10 to 60 drops of the tincture; for he finds that a very small quantity judiciously applied, will produce considerable effects; and he thinks that whatever is beyond necessity, it would be unwise to employ.

Alcohol is another of the topics standing in the title to Dr. Currie's work; by which term, he does not mean with common chemists, spirits of wine; but vinous and spirituous drinks. Alcohol (or strong drink) he says, is more heating than opium, and has less tendency to produce perspiration and sleep; but yet has a striking resemblance to opium in its effects.

In *healib*, like opium, if the mind is vacant and external objects excluded, and the stomach empty; strong drink inclines to sleep. But as sleep approaches, the heat of the body rising throughout and the pulse quickening, an agitation follows, which is often opposed to sleep. If the dose however has for the moment stupified all sense, still on the first return of sense, the drunkard is roused from his apoplectic slumbers by intolerable heat; amounting in one case (that of Dr. Alexander, who tried the experiment on himself) to 107 degrees; and this is accompanied with thirst, agitation, and consequent weakness, as also with obstructed perspiration. The author here, as perhaps in all other cases, where there is heat and a dry skin *without* local inflammation, would prescribe large draughts of water, or the affusion; which is likely to prove more effectual, if cold, than if warm. Opium, where the skin softens, favors perspiration in the drunkard; and sometimes, and perhaps by this very means, affords remarkable relief.

In *fever*, strong drinks must be given with the same precautions, as opium ; that is, be avoided in cases of great heat and a dry skin ; and reserved for those cases, where the heat is only a little above the natural standard ; unless perspiration is certain, when they may be used in a heat somewhat beyond the natural.

Such are the author's remarks on opium and strong drinks. They are offered only with a view to fever ; and he so little considers them as complete, that he proposes to resume the subject.

In the author's title page stands another topic yet unnoticed by us ; namely *inanition*, or abstinence ; and along with it, he handles another important, as well as long disputed point ; namely, whether fluids, and consequently nourishment if wanted, can *pass through the skin*.

A part of his conclusions on the subject of inanition or starving, are drawn from a case where a schirrous tumour took away the power of swallowing. The heat and in general the pulse were natural to the last ; the spirits even ; the intellect good ; the strength sufficient for walking about the house ; neither hunger nor thirst on the whole troublesome ; but after a certain number of weeks, a distortion of vision was followed by delirium and other symptoms, which closed the scene. Nourishing clysters gradually increased, in which liquid laudanum was largely mixed, especially in the evening ; together with a warm bath of water and of milk ; were the only applications. Another patient whose power of swallowing was destroyed by a different disease, used the clysters, but omitted the bath ; and never complained of hunger, nor always, nor very much of thirst ; his pulse being good, unless previous to death, which in him was easy and accompanied with the perfect use of all the faculties.

Hence the author remarks as follows ; 1° A regular pulse is no certain indication of the system being in order. 2. Vital heat is not principally owing to digestion ; the increase of heat after food appearing to arise from the influence of the stomach on *other* parts. 3°. As the first patient did not easily recruit his heat, when heat was taken from him, the power of doing this is to be held in proportion to the force of the living principle ; (and this is a fact which might before have been inferred from the experiments of John Hunter in the papers already cited, in the case both of vegetables and animals ; which Dr. Currie at the moment seems to have forgotten.)

We come now to some particularities respecting the *passage through the skin*, to which the first case leads us. The patient, in a balance sensible to the amount of a drachm, was found to have had *no difference produced in his weight by using the warm bath*, in three instances where the trial was made. According to the rate at which his body wasted from day to day, during many days, he ought to have lost five sixths of an ounce during the time he spent in the bath : but he appeared neither to have lost nor gained. He seemed indeed to perspire ; but the author conceives the appearance to have been owing to the vapour of the bath resting on his forehead. At the heat of 82 in the public baths at Buxton in England, the author (with various others) has found no change of weight : in other experiments he has found no change in himself in baths variously heated between the temperatures of 87 and 95 ; and in several cases of the diabetes, (where indeed a disease in the skin according to him usually occurs) the warm bath has produced no change of weight.

These

These experiments do not countenance the common supposition, that in case of a deficiency of liquids at sea, thirst may be prevented by wet penetrating *inwards* through the skin. The author is indeed aware of several conjectures to be urged in favor of this supposition ; as for example that what is taken inwards may not shew itself in the weighing machine, from being counterbalanced by what escapes outwards ; and that fluid may be taken inwards at lower temperatures than those of the warm bath. But he inclines to overlook these conjectures ; and he likewise dissents from the experiments of Dr. Falconer and Mr. Abernethy, as made only on a part of the human body at once.

He is strongly inclined to think, that though certain vessels * in the skin afford a passage *outwards* ; yet that the absorbent vessels lie below the skin, and never take up any thing from *without* ; unless in consequence of mechanical pressure, or of a wound or a disease in the skin, or of the destructive nature of the matter applied to it. He explains therefore the benefit derived in certain cases from wetness at sea, either to the coolness produced ; or to its preventing the wasting effects which would attend evaporation, could the air have access. The removal of the thirst, he attributes to a relaxation

* He conceives with Dr. G. Fordyce and Mr. Cruikshanks of London, that the matter of the perspiration is separated from the blood by the capillary arteries, and then thrown out by organic pores existing in the cuticle (however difficult to be discovered) which are connected with the extremities of these arteries ; and he supposes that in this process, there is not a separation merely, but a new combination ; during which a loss of heat may take place, accounting for a part of the coolness attending sweating.

laxation of those vessels in the skin which pass outwards, having effect on the vessels of the stomach by sympathy; just as perspiration in fever abates the thirst, without the aid of drinking.

But some experiments made in France by M. Seguin, the coadjutor of the celebrated Lavoisier, which are related by M. Fourcroy, prove the necessity of a new examination of the whole subject. In low temperatures, as from about 54 to 59 degrees of Fahrenheit, the loss of weight in the human body, says M. Seguin, is much greater when the body is exposed in air, than when it is exposed in water; because, according to him the *air* in the latter case, cannot pursuant to its office, dissolve the perspirable matter on the skin; so that a loss of weight can now only arise from what escapes through the lungs. At about 70 degrees, the disproportion of loss somewhat increases; as the air entering the lungs, from having been previously loaded with the moisture of the bath, does not so rapidly dissolve the perspirable matter in the lungs. At 90 and upwards, by the increased action of the heart and arteries, sweat flows from the skin, and lessens the above disproportion; which from being about 3 to 1 in favor of the air, becomes now only as about 2 to 1. But in no circumstances, does M. Seguin find any absolute increase of weight in the bath.

To decide however more precisely whether absorption through the skin occurred in water, M. Seguin dissolved in water a preparation of mercury, in which different venereal patients bathed their feet, and apparently without taking any of the mercury into circulation; unless where the skin was broken, as in the itch, &c. At last he directed his experiments upon himself, as a person in health; bathing a part of his arm in water containing a preparation of mercury; and covering the

glass

glass which held it, as also his whole body, his *mouth* excepted, with gummed or with waxed silk according to the case. In low temperatures, he found no effect. At about 72 degrees of Fahrenheit, mercury was taken into the body, but no water; whence he concludes, that the lymphatic vessels did not perform this absorption, since they would more readily have imbibed the water. When the heat of the bath was pushed on nearly to blood heat, even mercury was no longer taken up. Hence the author supposes that the mercury when the water was at 72, penetrated into the drops of sweat slowly moving outwards and thence into the body; which could not happen, when the drops of sweat rolled out faster, in greater heats.

When other substances act through the skin, M. Seguin in effect explains the case nearly as Dr. Currie. He decides also from these experiments, that contagion acts through the air and lungs, and not through the skin by contact; that the diabetes arises from water left in the lungs; and that dropsies occur from the absorbing being stronger than the exhaling vessels, (the absorbing being supposed to operate only on what is *within* the body, including what is found in the lungs.) Some of his other conclusions do not seem to regard our purposes.

Upon a *comparison*, it will appear, that in Dr. Currie's experiments, no weight was lost in the warm bath, at least that was discoverable by his weighing machine; but that in those by M. Seguin, weight was actually lost in the bath, though less than was lost under the same circumstances in the air. Surely these matters require elucidation, and happily they may be pursued by any person in any country. Indeed our inquiries demand to be extended to many other objects still more familiar. So simple a fact as the state of heat in starving persons, (supposing

(supposing the cause of the ambiguity not to be in the nourishing clysters) is still the subject of dispute ; and the same as to the heat in the diabetes. And Dr. Currie has perpetually to complain, that the heat is little observed in any disease whatever.

Whoever inquires experimentally into the comparative weights of the body and the powers of the skin, will of course seek to consult Sanctorius and other celebrated authors ; but let him not overlook the English Dr. Stark, of whose experiments Dr. Franklin was so fond. Dr. Stark, like many others in Europe, exposed his life in medical researches, and would himself have been more celebrated, had not his zeal brought upon him a premature death. Lieutenant, (now Admiral) Bligh has given a relation of a famine at sea suffered by himself and his companions, which deserves particular consultation ; for he was left adrift in a boat in the Pacific Ocean, during six weeks ; in consequence of a mutiny on board his vessel, which was conveying the bread-fruit, spice and other plants, to the British West-Indies. Nor will Dr. Franklin's remark be useless, as to the *loose texture of the skin*, after having long remained immersed in water.

The practice of *anointing* the skin among some of the ancients who were *fully* clothed, and among many nations ancient and modern using *little* clothing ; also calls for attention. Unction with them seems a custom alike prevailing in warm and cold weather. If new principles are called for to explain these usages, modern lights and modern accuracy will probably lead to them.

Dr. Currie connects the *warm bath* with the subject of *unguents*. He says, that the warm bath is used in the French, and is beginning to be used in the English, West-Indies ;

West-Indies ; and he supposes it salutary after exercise ; and that it restrains profuse sweating, keeps up the heat of the surface and extremities so as to prevent re-action in the arterial system, and soothes the sensations ; but he adds, that on leaving the bath, friction should follow, with the anointing of the surface to prevent evaporation. To this system, however, he would join flannel clothing next to the skin, after the Greek and Roman manner. Perhaps these things should accompany each other ; but without going so far, it is clear that cotton would be useful next to the skin both in hot and in cold countries ; pursuant to the boast of the English cotton manufacturer, who says that whoever uses cotton *once*, never quits it. The use of oil is also proper for swimmers ; and among other reasons (as Dr. Currie remarks) that the body may glide more easily through the water, as well as to guard them (as we have added) against the cramp.

Dr. Currie thinks that the perspirable matter of Europeans is not well fitted for the torrid zone, as being too liquid ; adding that the sweat of the negro is unctuous or oily. Has he or others made the comparison in a scientific view ; and taken the case of the Hindoo and other Asiatics, with that of the original Americans, into the account ? The question demands to be treated with caution.

Dr. Currie, in a paper in the *Appendix* to his work, speaks of a *ship-wreck of some Americans near Liverpool* ; adding remarks on the influence of fresh and salt water, hot and cold, on the powers of the living body immersed in it : the article being extracted from the *London Phil : Trans :* for 1792.

It appears as to the Americans, that two who died early during the accident, suffered from an alternate exposure

posure to air and to water (both salt and fresh;) that others survived, who were more plunged in the sea, one excepted, who was desponding, but who died later; and that he who suffered least, was a black, who was covered to the shoulders in the sea. The sea was about 35 degrees in its temperature, according to the author's present conjecture. The air was probably still lower, and attended during part of the time with sleet and snow and a piercing wind. The stay on the wreck on the whole was 23 hours. The two who died first, were delirious; none were ever drowsy; but all were thirsty and hungry. Mr. Amyat who related the story, had his hands and feet swelled and numb, but not senseless; his mouth parched; a tightness at the pit of the stomach; and distressing cramps in his sides and hips. Hence we may perceive the advantage of having been continually covered with the salt water.

This accident led the author into a train of experiments on what he esteemed the most fundamental power attending life; namely, the capacity of the body to *preserve the same heat under different circumstances.*

In his first experiment a young man who was plunged into a bath at 44 degrees of Fahrenheit, had the thermometer under his tongue reduced from 98 to 87; then raised gradually in 12 minutes to above 93; but upon being exposed to the wind at 44, though attendants were rubbing him, it fell again in two minutes to 87; nor did he, though every resource was employed, entirely recover his heat under three hours. A second experiment on the next day, gave nearly the same result; as did a third on the following day; but in the third, the man was afterwards plunged into a *warm* bath on being taken out of the cold air, when the thermometer *sunk* two degrees. But the thermometer rose again.

again more quickly than in the cold bath, and the heat was general over the body, and not confined (as in the cold bath) to the trunk alone. In a fourth experiment on another day, a longer stay in the bath produced inconveniences somewhat resembling those felt by Mr. Am- yat; and great pain followed afterwards from a warm bath at 104,* into which the party was too suddenly transferred. Three other experiments offer little essential variation, though two of them were tried on a new subject.

The cold water had always salt mixed in it, in the proportion of 1 to 24; and the cold was always lessened one or more degrees by the stay made in it.

The parties immersed were generally agitated, so that the pulse was quickened; but the cold bath sunk it 20 beats in the minute from its last rate; and at the wrist, it was scarcely to be felt. A sense of cold at the stomach was generally followed by a rapid fall of the thermometer; and heat applied there so generally restored the heat in other parts that the author is persuaded that the stomach or diaphragm or both, have some concern in the process of animal heat.

The following facts also appeared. 1°. The parties best resisted situations tending to produce cold, when they possessed most of their natural heat, as by wearing

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* In cases of this sort, 'Heat (says John Hunter) must be gradually applied, and proportioned to the living principle; but as the life increases, we may increase the degree of heat.' See his *Proposals for recovering persons apparently drowned*, in the *London Phil. Trans.* for 1776. Mortification arising from heat too suddenly applied to a frost-bitten limb, is one of the facts, on which he founds his opinion.

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a flannel dress. 2°. Cold wind operated more severely than colder calm weather. 3°. Though the human body rapidly accommodates itself to change, yet the change may be made too quick, especially when the strength is diminished. 4°. The action of cold water is more or less considerable, according to the vigor of the constitution. 5°. The condition of the mind operates also; fear increasing the influence of cold; and attention pointed to other objects, as in madness, diminishing it. 6°. These experiments require great caution, and the presence of every means necessary for counteracting their effects when carried too far.

The author in an experiment upon himself, passed alternately but gradually out of a cold into a hot bath, twice; staying a short time only in each bath, and being covered with a flannel dress; but his internal heat never varied from 96.

By another experiment, it was found, that the cold of *fresh* water is more difficult to support, than that of salt water.

In another paper of the Appendix, we find *Dr. Wright* again coming into notice, through *Dr. Duncan's Medical Annals* for 1797. He was still among other things using in the West-Indies external applications of cold in various shapes in the early stages of the ship-fever and of the yellow fever, and with continued success; and in the latter stages, he employed calomel in small doses, to procure purging and *sweating*. Where the stomach was too irritable for calomel, recourse was had to *Capficum* (or Cayenne, commonly called Kian, pepper) made into pills; and it has cured even after the black vomit. This pepper has been given in the putrid sore throat, in the West-Indies, with the most signal benefit.

In

In the course of this paper concerning Dr. Wright, Dr. Currie observes that perspiration seems useful in *every fever in every country*, not excepting the famous English sweating sickness ; but that for this purpose it must be *profuse*, and also *early*, since in the latter stages of fever it is often injurious. The mode of exciting it, he says, may however be mechanical. Mr. Thomas Graham for example, covers the whole surface of the body for this purpose with warm vapor, in the early stages. In the plague, Count Berchtold relates, that perspiration may be produced by a pint of olive oil, rubbed during four minutes, upon the patient in a close room over hot coals, with a clean sponge ; or if the first trial fails, then after wiping the body with a warm dry cloth, it may be repeated, and be aided by sudorific drinks. But in every case, the sweating must not only be early, but may be employed during the cold fit ; when it will still leave room for the use of cold water in the hot fit, should the hot fit still occur.

Before quitting Dr. Currie, we shall give him pleasure, by affording him an opportunity to rectify two or three oversights.

First, Dr. Cullen does not, as he intimates, neglect *cold* as a cause of fever ; though by inadvertence, that author once speaks of two kinds of *contagious* fever, as including *all* fever.

Next, Dr. Currie attributes the discovery concerning the near agreement of the heat of springs with the average heat of the place where they are found, to Dr. John Hunter ; a British physician of eminence, (but not related to the celebrated surgeon and anatomist of that name.) Dr. Hunter's reputation does not need the aid of

of borrowed fame. The first observer of the fact appears to have been Dr. John Roebuck, F. R. S. at least Dr. William Heberden's comment upon the subject implies it—(See London Phil : Trans : for 1775.)

Lastly, Dr. Currie seems also to have omitted to notice Dr. Crawford's paper in the London Phil : Trans : for 1781 ; where that amiable philosopher stated, that the *difference* between the color of the venous and arterial blood increases with *cold* and lessens with *heat* ; and that from the event connected with this difference, nature finds the means of proportioning the generation of heat to the call for it.* Dr. Currie knows that this difference of color had its proper cause † assigned to it, by Dr. Priestley ; which paved the way for Dr. Crawford's application of the fact, to explain the origin of animal heat as coming from the action of the air on the blood in the lungs. The above additional fact noticed by Dr. Crawford, if confirmed by a few more experiments ; will probably go far to remove Dr. Currie's difficulties concerning this beautiful discovery respecting animal heat, which he extended also to combustion. Mr. Cavendish and the French chemists have by their
new

* *Is there any decisive difference in the color of the venous and arterial blood in insane persons indicative of their known power to resist cold ; which the practitioner can pursue thro' all its mazes, so as to arrive at the means of assisting their malady ? Their power of resisting cold has indeed its limits, since their limbs may be frost-bitten ; and perhaps it seems greater than it is, from their attention (where they can command any) being directed to other objects ; in which they agree also with children.*

† Mr. Hewson and others had been aware that the air operated here, but they knew not how it operated. See London Phil. Trans. for 1776.

new system led to some modification of this discovery, (for it is no longer to be called theory;) but however this shall be decided by time, the essence of the whole is Dr. Crawford's, and will render his name immortal. Dr. Rutherford of Edinburgh, under their modification, explains the supply of water in diabetes to arise from 'a portion of the oxygen, (which in the ordinary course of things is exhaled in the form of an elastic vapor,) being absorbed in the form of water.' But Dr. Crawford's discovery requiring to be treated at length, we for the present drop any further discussion of it; especially as this hypothesis regarding diabetes, leaves its *symptoms* still unexplained.

In taking leave of Dr. Currie, let us do justice to his ingenuity, industry and candor. If his work stands the test of time, immortality also will be *his* lot. He is well known to many Americans frequenting Liverpool; but it is not perhaps known to all Americans, that besides Middlesex, no county in England can boast of so many able and spirited medical men, as that of Lancaster; especially if we include Dr. Haygarth in the number, as united with them by intercourse, though residing in Chester. Among the foremost of these, we may certainly place the excellent Dr. Percival of Manchester; to whose zeal for philosophy and for humanity, we may attribute in no small degree the honorable pre-eminence here mentioned.

As to our analysis, though it includes the chief substance of Dr. Currie's book containing 347 octavo pages, the reader will not fail to peruse that work, with pleasure; nor, having read that work, will the reader perhaps regret his having seen this analysis. Dr. Currie is not in every respect methodical; but he is more; he is original on some of the most important of medical subjects.

ADDENDA, &c.

P. 10, l. 12, *read*, expedients is simple.

p. 14, l. 14, *read*, in every.

p. 20. l. 9 from the bottom, *read*, practitioners in medicine.

p. 22, last line, for *his*, *read this*.

p. 26, l. 7, *after* employed, *insert* a mark of reference, and at the bottom add this *note*.

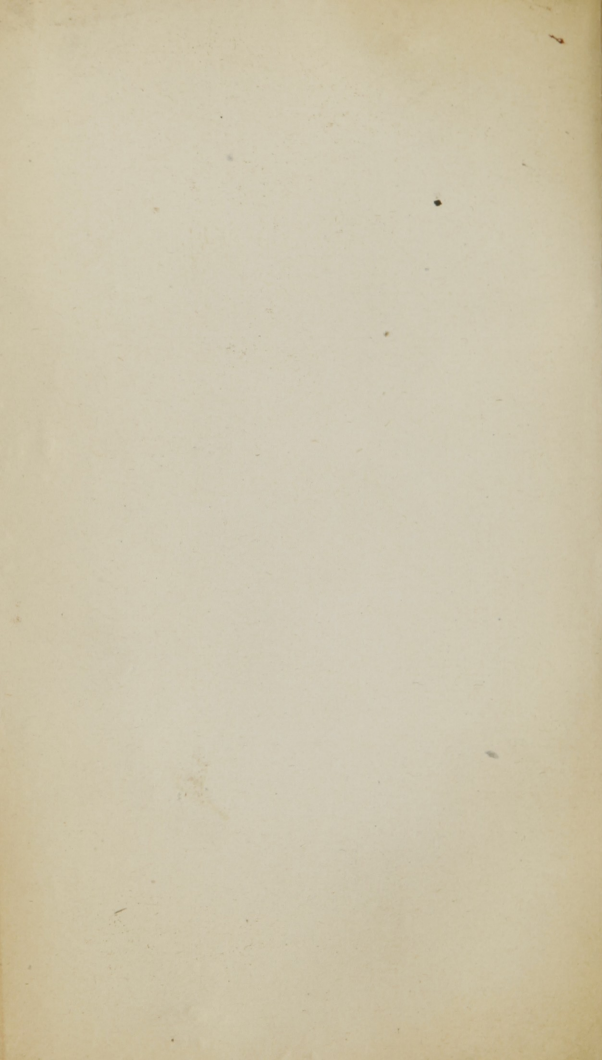
Whenever the fluid employed is carried off by evaporation or other accident, it is easy to put in a fresh quantity, in the manner used for putting in the first.

p. 32, l. 3, *read*, more or less.

p. 34, l. 12, *after* recovered, *insert* a mark of reference, and at the bottom add this *note*.

See a remarkable case of this kind in the London Phil. Trans. for 1786, p. 190.

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