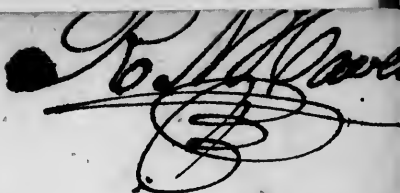


ON



BATHS AND MINERAL WATERS.

IN TWO PARTS.

PART I. A full account of the hygienic and curative powers of *cold, tepid, warm, hot and vapour* baths, and of *sea* bathing.

PART II. A history of the chemical composition, and medicinal properties of the chief Mineral Springs of the United States and of Europe.

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&c. &c.*

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PREFACE.

SOME years have now elapsed since my attention was first directed to the subjects treated of in the present work. The circumstances under which I began, and for a time continued to read on Baths and Mineral Waters, were such as to create in my mind a more than common interest for this department of medical knowledge. It was during a visit to Italy that the work of Franceschi, "*Igea Sulle Bagni, &c.*" fell into my hands; and during a long voyage from the Mediterranean to China, that I gained both amusement and instruction in translating it. I soon became sensible of the clearness of view and natural arrangements of the different kinds of baths given by this author, and I hoped, while improving myself, to be able to benefit the medical world by preparing a translation of it for the press. Full of this idea, I spent part of the time of a long voyage from China to Europe, in copying off the first rough draft into tolerably fair clerk's hand. On our arrival at Cowes (England), I posted up to London with the captain of the vessel, he to receive instructions for his subsequent destination to some port in the north of Europe, I to make arrangements with a bookseller for the publishing of my translation of Franceschi. Mr Callow, Crown Street, Strand, was the person to whom I gave the preference on this occasion, and from

whom I soon received an answer, which the records of literature show to be a very common one, in the case of young authors and their first productions: it was civilly declining to publish, and giving as the chief reason, that the second part of the work, on the Mineral Springs of Lucca, was too local in its bearing to interest the professional reader in other countries.

The manuscript remained undisturbed in my trunk during the remaining eighteen months of my stay in Europe; and it was only after my return to Philadelphia that I again presented it to a publisher. The same objection was urged by him as by Mr Callow; and it was suggested to me by some friends, that, to obviate this, it would be better to ingraft on the Italian work a notice of the chief mineral waters of Europe and of the United States. Acting on this advice, I set about collecting materials, by making notes and extracts, and arranging them after a certain order. Having visited some of the mineral springs in the western States, and the chief ones in Virginia, during the first year of my return to the United States, I was enabled to make gleanings, additional to the meagre printed accounts of those places. The only public evidences, however, of my industry in this way, were furnished in the shape of essays "On Baths and Mineral Waters," in the Philadelphia Medical and Physical Journal.* In these, the divisions of Franceschi were followed, and sketches of the hygienic and remedial effects of each variety laid before the reader. Notices, also, of some of the principal mineral waters of Europe were given.

* Vols. VIII. and IX.

But the essays were discontinued before I had reached the contemplated notices of the springs of the United States; and my memoranda remained as first made, until I began to prepare the present volume for the press.

In presenting this work to the public, I may reasonably anticipate for it a favourable reception, as it is the only one in which a connected view is to be obtained of the effects of the different kinds of baths on the animal economy, in health and disease. Some have directed their attention in a more particular manner to the subject of the warm bath: others to that of the cold. A few, indeed, such as Marcard and Franceschi, have treated of the varieties of bathing, but they have done little more than to furnish a sketch, an imperfect outline, serving rather to excite, than to gratify curiosity. Neither by these nor by other writers have the operation of general and local baths of all temperatures, and of vapour baths, in both acute and chronic diseases, been examined with care, and the scattered facts on the subject collected and arranged after a regular method; nor have suitable inferences been drawn from them to aid us in the enlargement of the domain of therapeutics.

The classification of baths which I have adopted, will, I believe, be found in conformity with the larger number of phenomena attending their use; and the explanations of the *modus operandi* of cold, warm, and hot bathing will, it is hoped, serve to fix the wavering opinions of the profession, and prevent the empirical use of agents which have undoubted power for good or evil, according to the circumstances under which they are employed. The principles inculcated in this work, as those which ought to

guide us in the use of baths, will be found applicable to the treatment of both acute and chronic diseases; and, also, in strict accordance with the general indications of cure, as based upon what is deemed the soundest pathology.

In selecting materials for this work, I have been more solicitous to obtain the facts and prominent opinions directly bearing on the subject, than to indulge in lengthened disquisition and a causeless display of retrospective lore. I have been satisfied, also, with introducing what I deemed fitted to illustrate and enforce my positions, without deviating into general criticisms of the faults of the authors; except where their own facts and practice were at direct variance with their hypotheses.

Notwithstanding my intention to be as brief as was consistent with clearness, I find that I have considerably exceeded the limits which I had first proposed to myself. The consequence has been to protract the publication of the work beyond the time originally designed. It is not at any time easy for a professional man to propose to himself or to the public, much regularity in the performance of his literary labours—still less was it in my power to proceed with uniform despatch in the present undertaking, tasked as I have been to the discharge of editorial duties in a co-direction of two periodicals, the one on hygiene, and the other on medicine, in addition to the daily routine of public and private practice. The reader will, it is hoped, find farther excuse for me by observing, that this volume, though containing a full notice of all the varieties of baths, and the principles on which their use is based, as well as a view of the medicinal powers of the mineral waters of this country,

and of the chief ones of Europe, is not, after all, so large as some in which only one of these topics is touched on.

If the second part, or that on mineral waters, be not richer in details respecting those of the United States, the fault is not so much attributable to me as to the persons more immediately interested in furnishing them. I made application to different quarters, for information touching the analyses of the waters of several mineral springs, and their medicinal virtues. By some, no answer has been vouchsafed ; by others, the notices supplied me have been very meagre. Had they who visited our springs, or who reside on the spot, taken the same pains to gratify laudable curiosity as the friend who wrote to me respecting the Salt and Red Sulphur Springs, I should have less to complain of on this head. Notwithstanding, however, these obstacles to a finished history of our mineral springs, I believe the reader will admit, that in the present work will be found fuller and more connected details, for the guidance of the invalid, and the information of the physician, than can be obtained from any other source at this time. In expressing this belief, it is not intended to intimate that amendments will not be required : I can merely assure those who suggest them on good authority, that they will be attended to and suitable publicity given to them.



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PART I.

BATHS.

ERRATA.

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* This and the misprint in page 262 are both corrected in the contents of chapters prefixed to the work.

CHAPTER I.

Of the importance attached in ancient times to bathing.—It was made a religious rite: held in high favour as a preservative of health.—The arrangements for bathing among the Greeks and Romans.—How practised at this time by the Russians, Finlanders, Turks, Persians, Egyptians, Hindoos, and American Indians.

BATHING may with great propriety be regarded as a practice not less congenial with our feelings of bodily comfort than conducive to vigorous health. We need not argue for its antiquity, when we see it resorted to in every stage of society, from the wandering savage of the woods to the polished inhabitant of the city. The same instinctive impulse by which, during the oppressive heats of summer, man and animals are led to seek the shade, and inhale with eagerness cool air, would prompt them to plunge into the nearest stream, as an additional means of refreshment and invigoration. We meet, in the best descriptions of ancient manners, with accounts of bathing in rivers; as when the daughter of Pharaoh and her attendant maidens went down to the Nile, and Nausicaa and her companions indulged in similar enjoyment in the

stream near her royal father's residence. Domestic baths, suggested by the wants and conveniences of life, were also of remote antiquity ; as we learn from Homer representing Diomed and Ulysses to have made use of such, after washing in the sea. So, also, this poet tells of Andromache preparing warm water for Hector on his return from battle ; and of Penelope calling in the aid of unctions and baths, to mitigate her melancholy for the prolonged absence of her husband. Minerva is feigned to have imparted renewed vigour to the wearied limbs of Hercules at the warm springs of Thermopylæ ; and Vulcan, in place of other gifts, offered him warm baths.

The importance attached to bathing, as a means of cure of loathsome disease, is well illustrated in the directions given to Naaman the leper, by the prophet Elisha, to wash seven times in the Jordan ; and still more, in the command of our Saviour, for the blind man to wash in the pool of Siloam.

As typical of moral purity, bathing, by frequent ablutions and immersions, was made to form part of the religious rites of the inhabitants of central Asia and the East. We find that, even prior to the time of Moses, and during the patriarchal age, these observances were strictly attended to ; as when Jacob commanded his family to purify themselves and to change their garments, before they went to Bethel to sacrifice. Job speaks of a like purification by snow water. It would seem, indeed, that the great Jewish legislator and prophet was not merely influenced in his enactments, in this respect, by the necessity of preserving the health of the twelve tribes, during their long journeying through the wilderness, and their subsequent residence in the land of Canaan ; but was, also,

swayed by the remote example of the patriarchs, and the more recent one of the Egyptians, whose priests washed their bodies three times a day, on the occasion of extraordinary sacrifices. So intimate was the connexion between bodily purity and moral truth deemed by the Jews, that not only the priests washed their whole bodies before they undertook to officiate in the temple, but the proselytes, born of heathenish parents, in addition to their being circumcised, were immersed up to their necks in a river, during which time they listened to an exposition of some of the precepts of the law. This custom was continued by John the Baptist. Mahomet engrafted in his code the lustrations of the Jews; and his followers at this time conceive themselves bound to wash the face, neck, hands and arms before each of the five prayers which they repeat daily. Besides these ordinary lavations, there are others peculiar to each sex.

The Greeks, though doubtless familiar with the practice, for the purposes of health and recreation, were indebted to the Egyptians for giving system to bathing as part of the medical art, and as connected with religious observances. The former people, in common with the Jews, acknowledged three kinds of purification by bathing, viz. immersion or dipping, washing of the hands and feet, and aspersion or sprinkling.

In a historical point of view, bathing assumed the most importance, as a part of hygiene, or that art by which all the agents of life and well being are systematized, and their separate and conjoined effect distinctly laid down. Popular prejudices, it must indeed be acknowledged, at times usurped the place of sober experience, and led to a fatal abuse of cold bathing; as in the case of the Spartans, who were in the practice

of plunging their new born infants into cold springs. While pointing out the florid health and robust frames of those who grew up to adult age, these people forgot, that it was owing to their very robustness that this severe treatment was tolerated, and that the tender and delicate sank under it. In more northern and inclement climates, a greater, though we must consider it questionable, necessity was thought to exist for cold immersion. Accordingly, we see that it is practised by the Finlanders, Russians, and other people of the extreme north. Cambden tells us that the Gauls, the progenitors of the Britons, had their sacred fountains which they called *diona*, and which were doubtless employed both for lustrations and cures. In England there were many cold springs, early celebrated for their curative powers, which were supposed to be of a miraculous nature, as that at Rye in Kent, into which a wonderful virtue was infused by the prayers of a certain Norman monk.

As might be anticipated from the importance attached to it in a religious point of view, and the necessity in warm climates of frequent ablutions of the skin, bathing first began in the East to be practised with all the artificial aids which refined sensuality could devise, for procuring the enjoyment of varied sensations, as precursors to languid repose. The Greeks readily adopted usages so congenial with their national love of pleasure and novelty; but, more sociable than their Oriental neighbours, and at the same time ever intent on mixing up the common affairs of life with Epicurean philosophy and patriotic pride, they joined their public baths to the gymnasia, so that athletic sports should be succeeded by bathing, and those again alternate with conversation on literature

and morals, while the people were sitting, or slowly walking under their long and finely sculptured porticos.

The Romans, at first imitators of the Greeks, eventually surpassed them and all other nations in the magnificence and extent of their baths. In Rome, water abounded of every grade of temperature; and even that of the sea and of the sulphurous fountain of Albula, near Tibur, was introduced. Within their vast precincts were found temples, palestræ for the sports of running, wrestling, boxing, pitching the quoit and throwing the javelin; and extensive libraries. Architecture, sculpture, and painting exhausted their refinements on these establishments, which for their extent were compared to cities: incrustations, metals and marble were all employed in adorning them. The baths of Caracalla were ornamented with two hundred pillars, and furnished with sixteen hundred seats of marble: three thousand persons could be seated on them at one time. Those of Dioclesian surpassed all the others in size and sumptuousness of decoration; and were, besides, enriched with the precious collection of the Ulpian library. We can entertain some idea of the extent of this edifice, when we are told that one of its halls forms at present the church of the Carthusians, which is among the largest, and at the same time most magnificent temples of Rome. Here we are furnished with one of the many monuments of the triumph of Christianity, in despite of the most persevering and cruel persecutions of the then sovereigns of the world. On this very spot, where the organ, and the choral strain of devotion are now daily heard, Dioclesian is said to have employed in the construction of his baths forty thousand Christian soldiers, whom, after degrading with

all the insignia of ignominy, he caused to be massacred when the edifice was completed.

The water required for such lavish use as took place in the eight hundred baths of Rome, was brought by aqueducts from the springs and streams of the hills, many miles distant from the city. So numerous were these aqueducts, that at one time it was supposed they furnished no less a quantity of water than half a million of hogsheads in the twenty-four hours. At the present day, although many have been destroyed, there remains enough, not only for every domestic purpose, but also for the supply of those numerous and beautiful fountains in which modern Rome excels all other cities.

The private baths, at some of the villas of persons of rank and wealth, vied in splendor with the public *thermæ*. According to Seneca, the walls were of Alexandrian marble, the veins of which were so disposed as to resemble a regular picture: the basins were set round with a most valuable kind of stone imported from the Grecian islands; the water was conveyed through silver pipes, and fell by several descents in beautiful cascades; the floors were inlaid with precious gems; and an intermixture of statues and colonnades contributed to throw an air of elegance and grandeur over the whole.

In the time of the republic, the baths were cold. Mæcenas was the first to erect warm and hot ones for public use. They were then called *thermæ*, and were placed under the direction of the ediles, who regulated their temperature, and enforced cleanliness in the establishments themselves, and order and decorum in the visitors. Agrippa, during the time he was edile, increased the number of *thermæ* to one hundred and

seventy, and in the course of two centuries there were no less than eight hundred in imperial Rome. The inhabitants resorted to the baths at particular hours, indicated by striking a bell or gong; though in this respect the regulation varied with the edicts of the different emperors. Adrian forbade their being opened before eight in the morning, unless in cases of sickness; whereas, Alexander Severus not only permitted them to remain open during the whole day, but also to be used through the night, in the great heats of summer. It was a common practice with the Romans to bathe towards evening, and particularly before supper. Some of the more luxurious made use of the bath even after this meal. We are told of many citizens of distinction who were in the habit of bathing four, five, and even eight times a day. Bathing constituted part of the demonstrations of public rejoicing, equally with the other spectacles, and like them was prohibited when the country suffered under any calamity. All classes resorted to the baths, and the emperors themselves, such as Titus, Adrian, and Alexander Severus, were occasionally seen among the bathers. The price of admission was very small, amounting to not more than half a cent.

There was a double suit of apartments in the public baths, one for each sex. In this respect the Romans preserved, at least for some time, more decency than the Lacedemonians, among whom the individuals of the two sexes bathed together promiscuously. Cicero tells us, that fathers could not bathe with their sons, after the latter had attained the age of manhood, nor a man with his son-in-law; and to such an extent was this reserve carried, at the first institution of public baths, that some were set apart for the exclusive

use of the females. Among the latter, those of Agrippina, the mother of Nero, were in such a style of splendour as to surpass all the rest. In the general increasing corruption of manners, under the emperors, bathing ceased to be used with the reserve imposed by modesty; and to such a height had the evil reached, that Adrian found it necessary to forbid the women, under penalty of repudiation, and the loss of their dowers, from bathing with the men; and to condemn to the punishment of death those of the latter who should dare to enter the baths reserved for the use of the females.

On the precise internal arrangement and distribution and use of the various utensils of the Roman baths, antiquaries are not well agreed. We know enough, however, to be assured, that the thermæ included halls and conveniences for cold, warm, hot, and vapour bathing. The warm bath, as that most resorted to, was double the size of the others. It consisted of a vessel or cistern of marble, stone or wood, distinguished by the name of *labrum*, which was lighted from above; around it was a balustrade, and behind this again was a gallery, in which they remained who were waiting for their turn to descend into the labrum: the pavement declined somewhat towards the middle to allow of the water to be carried off, which dripped from the persons who had just come out of the bath.

The hot and cold baths were arranged in nearly a similar manner to that just described. When the cold bath consisted of a cistern sufficiently large to admit of the exercise of swimming, it was called *piscina*, and afterwards by Pliny the younger *baptisterium*, a name retained by the Christians of the

early ages for the vessel in which the infant or convert was immersed at baptism.

In addition to these, there were vaulted rooms of various degrees of temperature, and designated accordingly by the names of *frigidarium*, *tepidarium*, and *calidarium* or *laconicum*.

The *frigidarium*, or cooling room, seems to have differed little from the temperature of the external air, except in its greater uniformity. The *tepidarium* was of a more elevated, but at the same time mild warmth. They were, both, rooms for temporary stay, to be made use of by those who proposed passing into the third one, *calidarium* or *sudatorium*; or who were afraid of the abrupt transition from the hot bath to the open air. This *sudatorium*, or *laconicum* as it was afterwards called, was in fact a sudatory of dry air, much more generally employed by the Romans than what we understand by a vapour bath, which is of moist air or of water vaporized. It corresponds precisely with a hot stove room of the present day, except that the stove proper was beneath and outside the *sudatorium*. There were, however, though more rare than the others, true vapour baths, into which the vapour was conveyed by means of tubes opening from the roof, and from which the moisture was seen to trickle down in the form of dew. The furnace (*hypocaustum*) was in a lower room: it served to heat the boilers above, from which the *labrum*, or basin for the warm and hot bath was supplied; from it also flues passed to the *laconicum* or dry sudatory, under the floors and between the walls of which they were distributed.

The room in which the bathers deposited their clothes before going into the bath, and dressed them-

selves on their return, was called *apodyterium*. As it was a common practice to anoint the body after coming out of the bath, there was an apartment, *oleothesium*, expressly appropriated to the purpose, and furnished with a great number of vessels filled with odoriferous ointments and essences of the most precious kind.

In the *conisterium* was preserved the powder to sprinkle over the body after the exercise of wrestling; this was scraped off with the *strigiles* before entering the bath. These *strigiles* were instruments made out of bone, ivory or metal, of a semicircular form, and rounded off from the extreme edge, into a groove through which the impurities of the skin passed off. They were employed as above mentioned, or on those who had come out of the vapour bath, and who afterwards washed themselves in tepid or cold water.

Singular as the practice may appear to those unacquainted with the laws of the animal economy, the Romans were fond of plunging into the *baptisterium* or cold bath, after having come out from the vapour or hot one: at other times they would be content to have cold water poured over their heads, while in the hot bath, or immediately after leaving this latter.

The example set by the capital was extensively followed in the different provinces of the Roman empire, such as Spain, Gaul, and Britain, in which the thermæ were numerous, and occasionally constructed in a style of great magnificence. In Asia Minor, of course they were not neglected; and we learn that Herod erected them at Tripoli, Damascus, Ptolemais, Cæsarea and Ascalon, in order, as it was allèged, to ingratiate himself the more effectually with Augustus.

Warm and cold bathing is common at this time

among all civilized nations, though by no means so general and easy of adoption, by the erection of suitable public buildings, as could be desired for either the purposes of health or comfort. It is usual to allege the less necessity for the use of baths, now than in ancient times, on account of the common use of linen and cotton garments next the skin, instead of the woollen and silk as then worn; but making all due allowances for our superiority in this particular, and admitting that any private gentleman of the present day can boast of a luxury of apparel unknown to Augustus himself, we must needs still believe, that we might imitate, more than has been done, the thermæ of the Romans, and their accessory practices to bathing, such as friction, strigillation, kneading the skin and flesh beneath, and inunction.

The nations of the great Scythian or Tartarian family are they among whom the vapour bath is in most general use. Of these the Russians and Finlanders, Turks and Persians are conspicuous for their fondness for a practice; the origin and continuance of which can hardly be referred to climate, when we find it under latitudes so remote from each other as the North Cape, and the Gulf of Persia; nor to religion, since it is participated in by the immense population of the Greek church, as well as by the hordes professing the Mahometan faith. There is this difference, however, that the people of the north are most partial to the moist, those of the south to the dry vapour bath.

A Russian bath is for the most part constructed of wood. It consists of one great hall, in which there is a stove against the wall containing, besides fuel, large stones in a state of incandescence. Opposite to this and at regular degrees of elevation, are two or

three rows of benches, on which the bathers sit and sometimes recline. Some apertures at the top admit a faint glimmering of light, and give vent to the vapour in which the bather is involved, and which is supplied by pouring water on the heated stones and shot. Some of these buildings have an antichamber, for the purpose of dressing and undressing. The heat of the vapour to which the bather is exposed is from 122° to 133° Fahrenheit. After the expiration of a quarter of an hour, or even double this time, when the body is in a profuse sweat, it is washed with soap and water, and gently switched with small brooms formed of the twigs of the birch tied together: affusions of tepid, and finally of cold water are then practised by pouring bucketfuls of it on the head. Sometimes, when there are no conveniences for a supply of cold water, a Russian will rush out from the bath and plunge into the nearest stream or lake; or even roll in the snow.

At one period both sexes used to visit these baths at the same time, without any reserve, and apparently without a consciousness of the want of delicacy, to say the least of it, of such a proceeding. Now, however, the men and women have, respectively, separate baths.

Adjoining the public ones, and forming part of the same building, are others of which a person may have the exclusive use so long as he desires, by paying a small sum additional. The arrangements of these latter are of a more comfortable character, and greater attention is paid in them to entire cleanliness than in the former. The one visited by Dr Granville consisted, 1st, of a spacious anti-room, seventy-five by thirty-three feet, and of considerable height, furnished with chairs, a table, &c.; it was kept at a temperature of

about 90° to 100° Fahrenheit: but in this respect could be diminished or increased by opening the door of communication, or a small wicker in the window of the inner or bath room. This latter has a wooden floor, is about seventy by thirty-three feet, and of proportionate elevation. The stove is in one corner of the room, part above the floor and part beneath, where it is supplied with fuel. The upper part forms a chamber, something like our common cooking stoves, on opening the door of which are seen, resting on a horizontal grating, stones and iron shot (cannon balls) kept constantly heated. From this to the opposite wall there are three stages, and a fourth at right angles to the second, six feet long by two broad, with a scroll to support the head, and reached by steps. On the floor opposite the door is a low dresser, on which are displayed large pans highly polished, and wooden pails of all sizes. Under the lofty double windows are two spouts from corresponding cisterns, giving out hot and cold water in abundance; also a brass tube rising between them to a height of ten feet, bent horizontally, and terminating in a rose, pierced with many holes, through which, by turning a small cock, water, either hot or cold, may be showered instantaneously and with considerable force. The temperature of the bath room is seldom less than 120° Fahrenheit, and frequently 132° to 140° . It is generally kept at from 15° to 20° higher than the ante-room, and increases with the height of the different seats, the lowest of which is first tried by the bather, next the second. Dr Granville could not remain more than an instant on the third.

The bather undresses in the outer room, and soon gets into a general perspiration. He then enters the

bath room, in which the *parilstchick* or bathing youth has been preparing soap suds, and filling vessels with cold and tepid water. The atmosphere of the apartment is generally clear; the light from a lamp placed between the inner and outer sash of one of the windows being in no way obscured. The first sensations after being a short time in the bath are unpleasant, consisting of fulness of head, hot skin and difficult breathing. The *parilstchick* now approaches to feel the skin, and not finding it overspread with sweat, opens the door of the stove and throws into it, and of course over the shot on the grating, a bucket full of water. Volumes of steam are instantly poured forth into the room, and a thick fog pervades every part: the body breaks out into a most profuse perspiration; the breathing becomes natural; the head clear and light. In this state, and while the atmosphere clears away, the vapour rising to the upper part of the room, the bather lies down in a sort of apathy and general relaxation, by no means disagreeable. The *parilstchick* next brings his large pailful of soap suds, and grasping with both his hands a quantity of the inner bark of the lime tree, (commonly called bass), cut into fine slips, and soaked in the soap suds, rubs every part of the body, softly pressing on each joint, and bidding the bather to turn when he thinks it requisite. After continuing this operation for some time, tepid, or perfectly cold water, at the pleasure of the bather, is scattered over him as he lies; and lastly, over the head and body generally, while sitting. Some at this stage of the operation jump from the bench to the floor, and have cold water showered over them, without feeling any inconvenience.

In the public baths no attendance is afforded, and

the persons bathing either perform on themselves or on each other, the several operations of rubbing, lathering and washing.

After the bath, the man of rank takes a drink composed of a mixture of English beer, French or German white wine, and sugar, to which are added toasted bread and a few slices of lemon. The peasant or the slave will content himself with a drink of spirits, or warm beer, into which, at times, mint is infused.

The reader has already seen that this fashion of bathing is not without parallel in history. Very nearly similar was the practice of the Romans, already adverted to. In fact there is less to surprise us in these abrupt transitions of temperature than would at first appear. The higher the animal heat, the greater is the power of resisting cold; and hence in the present case the highly excited state of the skin, it being both red and hot, enables it to bear with impunity the sudden application of cold water or snow: just enough of its heat is lost by the change to establish a pleasant medium temperature. It would follow, therefore, that the naked Russian is enabled to roll in the snow without injury, precisely because he has just come out of the excessively hot medium of the vapour bath; for had his skin been of the common temperature and ordinary sensibility; or had he waited until this part had become cool, and in that state of indirect debility following excessive excitement, it could not, any more than the internal organs with which it so closely sympathizes, have tolerated the great reduction of temperature and sedative operation effected by cold. An inhabitant of the north makes, by a stay in hot vapour, a sudden indeed, and excessive, but not less real preparation for meeting without injury intense cold, simi-

lar to that which he has more gradually and habitually made in keeping up his animal heat by means of hot stove rooms, a clothing of furs and woollens, and full diet. As I shall have occasion to take up this question when treating of the effects of the hot and vapour baths, I shall not dwell on it any longer in this place, but continue the historical sketch of the different modes of bathing.

The Finlanders have two species of sudatory, the dry and the moist. In the first the thermometer of Fahrenheit is from 140° to 167° (48° to 60° of Reaumur): in the second the heat does not exceed 122° Fahrenheit. The vapour in this last is pungent, and irritates the eyes; it extinguishes flame and causes great suffering, and even death to animals, if they be kept long enough in it. Individuals exposed to it become vertiginous, and are almost in a state of stupor: their animal heat is augmented one or two degrees, and the pulse in an adult gives one hundred and fifteen to one hundred and twenty-four beats in a minute; and in a child of ten years of age gives one hundred and sixty: infants when in it appear almost dead; and yet there are some who have had the boldness to expose these little beings twice a day to such a punishment. This is probably the reason why so many perish during the early period of life in Finland. We are, of course, prepared to hear of these baths producing a state of fever, easily recognizable by the redness of the skin, heat, and burning thirst, extreme debility, oppressed breathing, stupor in some, and obstinate watchfulness in others. With the augmented perspiration there is a diminished flow of the other secret fluids, such as milk, &c.: the senses are deadened, and the flesh in general becomes more flabby than usual. But after a while, as in all cases of increasing feverish heat, the

perspiration after a time ceases, nor can it be renewed by any increase of the temperature of the bath, even were this carried to the extent of 144° Fahrenheit. It has been ascertained that the dry sudatory, from 140° to 144° Fahrenheit, is more supportable than a moist one of 117° to 122° Fahrenheit. Formerly the Finlanders used, like the Russians, to roll themselves in the snow; but at present the custom is almost universally abandoned. In parts of Finland the females who have been recently delivered, are conducted to the baths with their offspring, on whom a thousand superstitious ceremonies are practised, while their little limbs are pulled about in every possible direction, in order that their horoscope may be satisfactorily cast. Some take a bath once a day; others, and they are the larger number, once or twice a week.

Baths are generally met with in all northern Europe, viz. Finland, Lapland, Sweden and Norway, attached to or forming part of the houses of all classes. Almost all the Finnish peasants, says Acerbi, have a small house built on purpose for a bath; men and women use it promiscuously, without any concealment of dress, or being in the least influenced by any emotions of attachment. The apartment is nearly dark, as there is no other window but a small hole, nor any light but what enters in at some chink in the roof of the house, or crevices between the pieces of wood of which it is constructed. My astonishment, says the writer just quoted, was so great, that I could scarcely believe my senses, when I found that these people remain together for the space of half an hour, and sometimes a whole hour, in the same chamber, heated to the 70th or 75th of Celsius, equal to 167° of Fah-

renheit, or within 8° of boiling spirits. The bath, here, was of vapour evolved by pouring water on stones of a red heat. The Finlanders will sometimes come out, still naked, and converse together, or with any one near them, in the open air. If travellers happen to pass by while the peasants of a hamlet or little village are in the bath, and their assistance is needed, they will leave the bath, and assist in yoking or unyoking, and fetching provender for the horses, or in any thing else, without any sort of covering whatever, while the passengers sit shivering with cold, though wrapped up in good wolf's skin. The Finnish peasants pass thus instantaneously from an atmosphere of 167° of Fahrenheit to one in which the thermometer is as low as 24° below zero, which is the same thing as going out of boiling into freezing water; and what is more astonishing, without the least inconvenience; while other people are very sensibly affected by a variation of but five degrees, and in danger of being afflicted with rheumatism by the most trifling wind that blows.

But it is to the east that we must look for the most numerous and splendid baths. They are naturally places of great resort to a people, who, like the followers of Mahomet in Turkey, Persia, and Egypt, are enjoined by him to frequent purifications as a ceremonial of religion; and who, indolent by the nature of the despotism under which they live, seek in them a means of passing away a portion of their time, and obtaining pleasing corporeal sensations, when those of a higher character are denied to them.

The public baths in Turkey are represented to us as elegant and noble structures, built with hewn stones, though, according to Buckingham, the approach to

them is dark and mean. The inner chambers are capacious, and paved with slabs of the rarest and most beautiful marble. A Turkish bath consists of three, or sometimes only two apartments: the entrance is into a spacious and lofty hall, well lighted, and having a fountain in the centre: round the sides are high and broad benches, on which mattresses and cushions are arranged; here the bather undresses, and receives a loose wrapper or gown, and a napkin is put round his waist; he slips on also a pair of wooden sandals. Thus prepared he goes into the second room, which is of a moderate degree of heat, or if there be but two, he passes at once into the bathing room proper, which is vaulted and receives light from the top. In the middle of this last is a marble estrade, elevated about eighteen inches: on this the bather stretches himself at full length, and is soon thrown into a profuse perspiration by the heated air of the room. During this time an attendant rubs the skin strongly with a horse hair brush or bag, so as to cleanse it of all impurities: he then kneads and moulds the body with his hand for a considerable length of time, and, if required, stretches the limbs in succession, so as to make each joint snap most audibly, and give a person unaccustomed to the operation, the idea that his limbs are actually dislocated. To this succeeds rubbing and washing the body with a lather of perfumed soap, an operation performed near one of the recesses or cabinets at the side of the room, where is a marble basin supplied by pipes with streams of hot and cold water, so as to allow of the bather giving himself a final ablu- tion of such a temperature as may be most agreeable to him. There is a slight slope of the floor near the wall, by which the water falling from the body of the

bather trickles down, and is carried off by suitable pipes. After the last washing he returns to the second or middle room, in which he stays a few minutes, and covers himself with a dry wrapper, extending from the breast to the feet. Thus prepared, he issues out to the first apartment or hall, where he undresses; and where he now lies down on a mattress for about half an hour, or reclines on the same, while smoking or drinking coffee.

In the cities, the public baths are distinct for the two sexes: in the smaller towns and villages, if there be but one bath, the women resort to it during the day time; the men in the night. No distinction of rank prevails on these occasions; each person is attended to in the order in which he enters the bath room: nor are religious prejudices allowed to prevent any description of people from availing of the enjoyments and comforts which it furnishes.

Nothing can be more luxurious than the private baths of the wealthier and titled Turks. The rooms are lined with the finest marble; the basins supported by columns with gilded capitals; all the vessels are of gold or silver; the linen is of the finest kind, and the sandals even are studded with pearls, emeralds and diamonds.

The Greeks, Armenians and Jews, though not in the habit of bathing so frequently as the Turks, are not backward in displaying considerable luxury in their establishments for the purpose.

Of all Turkish remedies, the vapour bath, says Dr Madden, is the first and most efficacious in rheumatic and cuticular diseases. He has seen them removed in a fourth part of the time in which they are commonly cured in England. In such cases, he conti-

nues, I cannot sufficiently extol the advantages of the Turkish bath: the frictions employed is half the cure, and the articulations of every bone in the body are so twisted and kneaded, that the most rigid joints are rendered pliant. I have trembled to see them dislocate the wrist and shoulder joints, and reduce them in a moment: their dexterity is astonishing, and Mahommed's shampooing at Brighton is mere child's play in comparison. As a luxury, Turkish bathing cannot be better described than in the words of Sir John Sinclair: "If life be nothing but a brief succession of our ideas, the rapidity with which they now pass over the mind would induce one to believe, that, in the few short minutes he has spent in the bath, he has lived a number of years."

The Persian baths, in the approach to them and their external appearance, as well as in the cleanliness, lightness and style of ornament of the first hall and undressing room, are superior to the Turkish; but in their internal arrangements and conveniences, are by no means equal to these latter. The bather has to lie down on the floor in place of on an estrade; and he is merely well, though roughly scrubbed; and subsequently the impurities of the skin are rinsed off in a large cistern, from which there was neither a running stream to carry off the foul water, nor cocks of hot and cold to renew and temper it at pleasure, as in Turkey. A still more marked and characteristic national difference is thus described by Mr Buckingham. (*Travels in Assyria, Media and Persia.*) In place of the luxurious moulding of the muscles, the use of the hair bag, or glove for removing the dirt, and the profusion of perfumed soap, with which the Turks end a course of treatment full of delight, the Persians

are occupied in staining the beard and hair black, the nails of the toes and fingers of a deep red, and the whole of the feet and hands of a yellow colour, by different preparations of henna. This operation is the most unpleasant that can be imagined. The Persians do not shave the whole of the head, as is usual with most of the Turks and Arabs, but taking off all the hair from the forehead, over the crown and down the neck, for about a hand's breath, they leave on each side two large bushy masses depending over their shoulders. These are almost as full in some individuals as the apparent wigs of the Sassanian medals; and in others, they are sufficiently long and large to meet and cover the neck behind, which would deceive a stranger into a belief that they wore the whole of their hair without either cutting or shaving it. This, then, with a very long and full beard, in which all the people here take pride, is plastered with a thick paste, of the consistence of hog's lard, and not less than two pounds weight is sometimes used on one person. It possesses a strongly astringent and penetrating quality, and requires great skill in the use of it to avoid doing considerable mischief. As the eyebrows are plastered with it, as well as the rest of the hair, and as it softens by the heat of the room and of the body, it frequently steals into the eyes, and produces great pain. The mustachios also sometimes give a portion of this paste to the nostrils as well as to the mouth, and never fail to yield a most unpleasant odour to all within their reach. The patient (as he may well be called) reclines on his back, naked, and on the warm stone floor, with his eyes and mouth completely shut, and not daring to breathe with too great freedom. He remains in this manner for an hour or two at a time, while the

operator visits him at intervals, rubs his hair and beard, patches up the paste where it has dissolved, or is fallen off, and lays on fresh coats of the dye on the nails, the hands, and the feet. Some of these beard-plastered elders, fresh from the hands of their attendants, look oddly enough, with different shades of red, black and grey in their beards; for it takes a day or two, according to the quality of the hair, to produce an uniform blackness; and this requires to be renewed every week at least, to look well, as the roots of the hair which grow out after each time of staining, are either brown or grey, according to the age of the wearer, and contrast but badly with the jet black of the other parts.

When all is finished, and the visiter leaves the inner bath, he is furnished with two cloths only, one for the waist and the other to throw loosely over the head and shoulders: he then goes into the outer room into a colder air, thus thinly clad and without slippers or pattens; no bed is prepared for him, nor is he again attended to by any one, unless he demands a nargeel to smoke; but most generally he dresses himself in haste and departs.

The Turkish bath, continues Mr Buckingham, is far more capable of affording high sensual pleasure, and is consequently visited as much for the mere delight to the feelings which it produces, and to lounge away an agreeable hour, as for the performance of a religious duty; while the Persian bath seems altogether resorted to for the purpose of the toilette, as one would submit to a hair dresser to have his hair cut, curled, powdered, and set in order for a party.

The baths of Egypt and India differ but little from the Turkish ones. Savary gives a most glowing description of the first, so much so, indeed, that other

travellers who could not view things with the same partial eye, have not been backward in accusing him of being rather too imaginative. The chief peculiarities in the Egyptian bath are the burning of perfumes, the use of the pumice stone to remove all callosities from the feet, and mild friction and kneading (shampooing) of the body by an attendant, after the bather has returned to the first or undressing room.

In both Turkey and Egypt the women are excessively fond of bathing; because, while enjoying its peculiar pleasures, they can indulge at the same time in a certain social strain of conversation and even merriment, which their national usages deprive them of at home. Sometimes they bathe daily, and at the least, twice a week. More voluptuous than the men, they wash the head and the rest of their bodies with rose water, anoint and plait their black hair, blacken their eye lashes, and die the nails of their hands and feet with the juice of a shrub indigenous to those countries, and called HENNA: finally, they perfume their clothes with the grateful odour of the aloe wood.

In the East India baths, the visiter, after having reached the third or inner room, and being extended on an estrade, has warm water poured over his body by an attendant, who at the same time kneads the flesh and stretches the limbs; but to a much greater extent than in the countries already spoken of. After having performed the operation in the usual way on the bather, this man directs the latter to turn on his face: he then kneels on the loins, takes hold of and pulls the shoulders and arms, and gives a jerk to all the articulations of the back; he next gives strong slaps to the more fleshy parts; and arming himself with a horse hair glove, he rubs the skin of the bather with such force

that he himself is thrown into a copious perspiration: finally, he removes all the indurated or horny parts of the skin with pumice stone, anoints the surface with scented lather of soap, and concludes by shaving and dressing the hair. These manœuvres last at least three quarters of an hour, after which the subject of them having returned to the first room, reclines on a couch while smoking his *hooka* and sipping coffee. The women are passionately fond of these baths, and often pass the greater part of the day in them, extended on a couch, and surrounded by slaves, who gently rub with their hands their lower limbs, and sometimes the whole body, so as to produce the most delightful sensations. It is, in fact, animal magnetism, with all the aids devised by voluptuousness.

The Bramins, like the orthodox Mahomedans, are required to perform their ablutions three times daily.

Among the accessories to the bath may be mentioned the practice of depilation, so common with the followers of the prophet. It is performed by applying to the hair, or rather to the skin itself, a mixture, called *rusma*, consisting of orpiment (sulphuret of arsenic), and quick lime, made up, by the addition of some fatty matter, into a kind of pomatum.

The Indians of North America have also their fashion of bathing, which is not very dissimilar from that of the Russians. They construct a kind of stove by fixing several small poles in the ground, the top of which they twist together, so as to form a rotunda, and then cover it with skins or blankets, so accurately that the external air is completely excluded. The space left for the introduction of the body of the invalid or person about to take the bath, is closed so soon as he gets in. In the middle of this small apart-

ment they place red-hot stones, on which water is poured until a steam arises that produces a high degree of heat. The effect on the person inclosed is a speedy and profuse perspiration, which may be prolonged at will. Immediately after coming out he hastens to the nearest stream, into which he plunges, and bathes there for about half a minute: he then puts on his clothes, sits down, and smokes with great composure ; and, what is of no little importance, with a thorough persuasion that the process will prove efficacious. This sudatory, says captain Carver, is often resorted to for the purpose of refreshment ; or to prepare for the transaction of any business which requires unusual deliberation and sagacity.

CHAPTER II.

Of the Skin; its structure and offices; its connexion and sympathies with other organs; the manner in which it is affected by bathing.—Effects of stimulants relative.—Temperature of the skin and living body; how preserved.—Influence of heat and cold, alternately applied; variety of effect, according as the body is immersed in air or water.—Abstraction of caloric and the means of evolving it.—Modifications by age and season.—Effects of intense heat and of extreme cold on the skin contrasted; the circumstances under which a temporary increase of heat or cold respectively to the skin is required and beneficial.—Impressions on particular portions of the skin affect internal organs.—Inferences as to the means of protecting the skin and warding off various diseases.—Clothing; the use and effects of flannel worn next the skin.—Summary.

BEFORE we can clearly understand the manner in which bathing affects the animal economy, we must picture to ourselves the extent, structure and properties of the skin, or of that surface on which the first impression of the watery fluid is produced. The skin, the investing tegument of the bodies of all animals, has in man a superficies of about fifteen square feet. It is composed of three laminæ: an outer, called the cuticle, or epidermis, of a horny nature; a middle, of a soft pulpy consistence,

called *rete mucosum*, or mucous body; and an inner, of a dense resisting character, called true skin or chorion. On the upper surface of this last, and immediately under the mucous body, and partly imbedded in it, are distributed in great profusion small vessels, some carrying blood, others conveying lymph; and a fine net-work of nerves. The cuticle has no sensibility, and little or no vitality: it may sometimes be partially peeled off, as from the hands and feet, without pain: it is readily exhibited in what is called the raising of the skin by a blister. If it be peeled off at this time, the mucous portion is seen covering the true, and now inflamed red skin beneath. In the mucous portion resides the seat of colour, for the upper and lowermost strata or laminæ are very nearly alike in all mankind. The use of the cuticle is to lessen the intensity of impressions, which would otherwise be too painful on the nervous or sentient expansions of the true skin: it prevents also the direct application of various substances to the mouths of the small vessels, and their consequent absorption and introduction into the blood. If it be, however, a long time immersed and soaked in water, especially warm water, it allows this fluid and the ingredients which the latter may hold in solution, to transude through and act on the true skin. Some of the outer portions of it will even come off with very slight friction after we have left the bath, showing that, something like the outer bark of the tree or scales of fishes, it can be rubbed off, and renewed by fresh depositions from the vital parts beneath, or the true skin. We are not however to suppose it entirely impervious, even in its common state. It has openings or pores, which admit of the escape of perspirable matter, and certain gases, which are

given out from the terminations of the small vessels of the true skin: but these openings are not direct communications; they are of a valve-like nature, or oblique, and, as it were, go some way under the cuticle, before they open externally. Hence, in order to introduce any article from without into the body, through a healthy skin, we must use much friction, and force it in a measure into these oblique and very minute orifices*. The protecting power of the cuticle is clearly seen when we remove it by vesication: various medicinal and poisonous substances applied to the true skin then produce with great promptness their peculiar effects on the animal economy; whereas if simply put on the cuticle, they would not have been felt at all.

Through the pores just spoken of, escape the perspirable matter, called, when vapour, insensible perspiration; and sweat, when condensed into drops or fluid; also different gases, viz. carbonic acid or fixed air, and nitrogen or azote. In addition to these there is also another kind of fluid, of an oily nature, given out from small bodies called sebaceous follicles or glands, which open directly on the cuticle; they are found most numerous on the nose, forehead, scalp, about the lips, especially at the angles, and in the hollow of the arm-pits, &c. It is this fluid which soils the linen, and which causes the water to collect in drops on the skin when we come out of the bath. The skin possesses, in addition to the function of secreting or eliminating the above gases and fluids, that of absorbing or taking in gases: viz. oxygen and nitrogen, and the watery vapour of the atmosphere. In

* I am well aware that this view of the cuticle is not taken by all anatomists or physiologists. Some deny the existence of pores, and refer the passage of fluids to mere imbibition or transudation.

fine, it displays nearly identical powers with the lungs in respiration, by its secreting and absorbing the same gases with these latter, and also a watery vapour. Such indeed is the community of function, that in some animals, as in the common leech, both are performed by the skin; and others, such as frogs, will survive longer the excision of their lungs than the loss of their skin.

This tegument is directly continuous with that lining the nose and mouth, and the lungs and digestive passages and does not, except in the absence of the colouring portion and the thinner cuticle in the latter, differ from it*. Here we see another cause why the state of the skin both modifies and is modified by that of respiration and digestion. It is also connected, in a similar manner, with the renal apparatus, and other important organs in both sexes, and exerts, in all its varying conditions, no little influence over their several discharges.

In addition to its being an outlet for the discharge of fluids and gases, the retention of which would be hurtful to the animal economy, and a surface for the absorption of other principles required for health, the skin is, also, in virtue of its nervous expansions, the sense of touch. Not only does it perform these double offices, the first connected with the growth and preservation of the balance of the different parts of the body, and the second with general sensation and the states of the mind to which this gives rise, but it also plays a part more purely physical. Consequent on a copious perspiration and moistening of the whole

* The sameness of cutaneous and digestive surface is well illustrated in the experiment of turning an animal of the polypus inside out: the skin becomes stomach—the stomach skin.

skin, is an evaporation from its surface. The effect of this last mentioned process is the same here as in all other cases, and consists in a reduction of the temperature of the body from which the evaporation takes place. Franklin was the first to point out this interesting fact: he compared the transpiration of the human body to what takes place in the unglazed vessels called *alcarazas*, which allow the contained fluid to ooze in part through them, and appear on the outside. By this means, when exposed to the sun, there is a constant evaporation, and consequent diminution of temperature of the vessel and the fluid contained in it.

To appreciate better the effect of bathing on the external portion of the skin, or the cuticle, we must bear in mind the fact already adverted to, of this tissue being a deposition from the inner or true skin, and hence of the readiness with which it is in part detached and rubbed off. If we scrape the skin with the blunt edge of a knife, we remove a kind of farina or branny powder, which is the outer and looser portion of the cuticle, and which sometimes accumulates on the surface in considerable quantity, when the skin, especially of the feet and hands, has not been washed for some time, as in cases of long sickness and habitual neglect of cleanliness.

Immersion in water, of whatever temperature, has the effect of softening the cuticle, and, if not of detaching this outer furfuraceous or bran-like portion, at least of preparing it to be more readily rubbed off by common friction with the hand or towel, and by strigillation or scraping. Every person on coming out of a bath is sensible of this fact, and is doubtless surprised at the quantity of such matter which

comes off from the skin by tolerably rough rubbing. It is obvious, therefore, that if it be allowed to accumulate, the cuticle is thickened, and the passages for the discharge of the oily fluid, spoken of above, as well as transpiration and absorption, are obstructed and imperfect; or this cuticular matter becomes mixed and incrustated with the common oily and perspirable discharges from the skin, and serves greatly to disturb the functions of this important organ. Hence we can readily understand how bathing is of primary necessity, and at the same time admit, that in as far as regards the essential point of purification, all baths will be attended with nearly similar good effects. Whether a person bathe in cool, warm, or hot water, if he stay in for a moderate period, and on coming out have friction of the skin performed, his cuticle will be freed from the outer scurf, and prepared to allow of the free passage and introduction of the appropriate fluids and gases. Associated with this improved state of the skin, will be one of comfort and relief to the internal surfaces and organs, and a general feeling of well-being diffused through the animal economy.

The second and important series of effects from bathing, are referable to the temperature of the fluid in which the living body is immersed. These are produced on the nervous system, and through it on the circulation of the blood, respiration and other important functions. The first impression is on the extremities of the nerves expanded over the true skin, and beneath the mucous body or colouring pigment and the cuticle: this is transmitted to the brain, where it is converted into sensation, varying with the nature of the agency and the susceptibility of the

nervous system. A few physiological remarks will find their place here, and prepare the reader for the better understanding of what follows.

It is not sufficient that the several organs be nourished by blood and other fluids, and supplied with nerves ; they must have appropriate impressions made on them by particular substances termed stimulants, which, when applied, increase the sensibility of the organs, and invite more blood to flow towards them. It is thus that the nerves are kept in a certain degree of exercise, and the vessels full, and in a measure turgid. Those agents which have a directly contrary effect, by paralyzing the sentient extremities of the nerves, and diminishing general sensibility and powers of perception, and retarding the flow of blood to the part, are termed sedative. We have examples of the first, in the effect of light on the eye; air, put in motion, on the ear ; pure air on the lungs ; food and drinks on the stomach ; and so on. The instances of the latter are presented in darkness, perfect stillness, stagnant atmosphere, and privation of aliment.

It may be alleged that darkness and the like being mere privations, cannot be considered as separate powers or agencies, since they are merely the absence of customary stimuli. This is the fact agreeably to rigid logic ; but yet, an arrest or retardation of the movements and functions of the animal economy is attended with as marked phenomena as either accelerated or excessive action. In physiology, we know that, if the appropriate stimulus be withheld from an organ, so as to prevent for any length of time the sensations peculiar to the part, there follows at first feebleness, and finally loss of function, similar

to what would ensue on the application of a direct sedative.

Occasional abstraction of its appropriate stimulus renders an organ more susceptible to the impression of this latter, as is the case, for example, of a person who has been for some time in a dark room, and then returns to the light of day, or of a lamp or candle. Hence the degree of excitement or increased functional activity of an organ depends not only on the stimulus applied to it, but also on its susceptibility : in other words, the same stimulus operates with a force varying according as its application is continued or intermittent. If, therefore, we desire to increase the power without augmenting the amount of a stimulus, we have but to abstract the organ or part from the operation of this latter for a definite time. Thus the light of a candle, which enables the eyes to see with readiness, and is rather grateful than otherwise, becomes excessive, and produces involuntary closure of the eye-lids, if it be suddenly introduced, just as we awake from a sleep, or after being in darkness for an hour or two. The striking of a clock in a house startles a stranger, who hears it for the first time, when it is hardly heard by the residents, or if heard, is followed by no distinct perception. A person long hungered and fasting will be excited to a feverish state by a portion of food, too small to produce the least sensation in one who sits down to his regular meal.

The more tolerant a sense or organ is of its accustomed stimulations or impressions, the more vigorous we find it to be in the exercise of its office : hence a means of strengthening a part is to exercise it regu-

larly and often; in other words, to place it frequently under the influence of its appropriate stimulus. This is what may be called direct stimulation, and the persistence of the practice is both evidence and cause of vigor. Habit, that is, a suitable education of the organs, will enable us to give them often a great degree of promptness and extent of function, as in the eye or ear long practiced; in the stomach accustomed to much stimulating food; the muscles to varied movements; and so on. But here we must be cautious least we urge the exercise to undue bounds; if we produce thereby not only common and distinct perception, but some degree of uneasiness and pain, we may be sure that we have gone too far, and that the part, instead of gaining, has lost vigor, and is thrown into a state of indirect debility—that is, debility following excessive action. Its powers of resistance are now less, and it is liable to be seriously and permanently injured, unless the exciting cause or stimulus be withdrawn. It is thus that eyes, strained as it were by much writing, or reading fine print, or by engraving, or fine needle work, can only recover their former powers of vision by the sufferer desisting from these employments, and shunning exposure to any other than the mildest light. Habit, then, we are to remember, is only useful in giving energy to a part or the whole economy, when the exercise is not productive of uneasiness, or of a lassitude that cannot be recovered from by rest. If, on the contrary, the exercise be followed by painful and morbid sensations, a persistence in the practice or continuing the habit does but aggravate the mischief. Not only must time be allowed in this case for the nerve or nervous expansion to recover its healthy sensibility, but also for

the small vessels which, in the excessive exercise of the part, were turgid, some filled with blood, and some with other fluids, to expel their contents, and be restored to their original diameter. It is hence wisely ordained, in order to guard against these sufferings from the above causes, that the different senses should have intervals of repose, that is, that their exercise should only be intermittent. Alternate action and repose is the condition for their healthy existence. Even in internal parts, which cannot actually rest entirely, such as those by which the circulation and respiration are performed, there is a diminished activity at particular periods, in order that they may acquire fresh vigor for subsequently greater acceleration of function.

We have seen, in a preceding paragraph, that the abstraction of the customary stimulus of an organ renders the latter more susceptible to subsequent impressions. If the abstraction be long continued, the part becomes morbidly susceptible or irritable, and cannot bear, without pain and disturbance, the least stimulation,—as when the eyes have been long kept in darkness, and day-light is admitted,—when a person has suffered from protracted hunger, and eats the smallest portion of meat,—or from intense and prolonged cold, and is exposed to the mild warmth of air in a room heated by fire. But again, our organs long deprived of their accustomed stimuli, become feeble for want of exercise—they are thrown into a state of direct debility, and linger and die, if not roused to action by the delicate application and gradual increase of their appropriate stimulating agents. Now, although habit or particular training will, unquestionably, enable us to be content with a much smaller amount of stimulus than is required in the common course of af-

fairs, yet, whenever the abstraction is sufficiently long and complete to force the organs in the animal economy generally to be in a quiescent state, or is followed by disturbance, or pain and irritability, on the customary stimulus being at length restored, debility and languid function will result.

The condition, therefore, for the healthy function of an organ, and it may be added of the whole animal economy, is, that it shall not be kept in such a state of long and forced excitement as to create pain followed by languor ; nor, on the other hand, of entire and protracted quiescence, so as to make the application of its stimulus painful and disturbing. Our sensations would seem, from these premises, to be a tolerably good standard by which to judge of the measure of the augmentation or decrease of the stimulants that are applied to their several organs, respectively. Let us next apply these principles to the phenomena of life, which take place on and by means of the skin. For the better understanding, however, of the laws by which its functions are governed, we must premise some observations on the production and evolution of animal heat.

A constant office of the skin as an organ of touch, is to transmit through its nerves to the brain the impression produced by the temperature of the air and inert matters with which it is brought in contact. The sensation or perception of heat or cold then results. When we speak of the temperature of a substance, we understand the sensation of heat or cold produced by its application to our bodies, or the number of degrees to which the thermometer rises by contact with it. This double effect is owing to a very subtle matter called *caloric*, or the fluid of heat, which is disengaged from

all bodies, in varying quantity, and which in the first example acts upon the nerves of our organs, and mainly those expanded on the skin, and its continuation, the lining membranes of the lungs and stomach; and in the second case is interposed between the molecules of the mercury in the tube, so as to give them more volume when the caloric is introduced, and cause diminished size when it is withdrawn or in minor quantity*. All inert or unorganized bodies are not only disengaging, but they also absorb or receive caloric, in a determinate quantity, so that, if two bodies of unequal temperature are placed contiguous to each other, the warmer will become cooler, and the cold gain warmth, until they are both in equilibrium, and act on the thermometer alike. This effect is performed the more readily, according to the proximity of the two bodies and their power of conducting caloric.

Living bodies are not subjected to this law of the equalization of caloric: not but that they are penetrated with this fluid when it is disengaged from warmer substances, and give it out to others of a reduced temperature. The cause of their independence is in their evolving, of themselves, by a series of vital actions, the caloric necessary for their well being, so that they are promptly able to supply the loss of what is abstracted from them by foreign bodies, and to appropriate without inconvenience what is introduced from without. By this means they sustain themselves at a constantly equable temperature, peculiar to themselves, and independent of the medium in which they

* Many of our readers know that the theory of caloric being a fluid, is not admitted by all chemists and natural philosophers; but the explanation of the phenomena in which it plays a part, will be sufficiently accurate by our admitting its fluidity.

may happen to be placed. They are apprised, however, of the two conditions of high and low temperature to which they are exposed by the sense of touch, and hence, as we express it, the sensations of *heat* and *cold*.

The human body in its healthy state of existence has a temperature of about 98° of Fahrenheit: this applies to the internal parts of the body, and the blood and fluids circulating through it; but not to the skin, if we except that in the axilla and some few other parts. The living body is constantly forming caloric or the fluid of heat, which is variously disposed of in processes peculiar to the animal economy, as in the formation of watery vapour from the lungs and sweat from the skin. This heat is also freely communicated to inert bodies around as well as to the atmosphere, which is for the most part of a less temperature than the living body. Occasionally, indeed, the medium, whether of water or air, is of a higher temperature, and then the body receives in place of transmitting heat; as is the case during immersion in a hot bath, and with the inhabitants of parts of the inter-tropical regions. In general, however, the living body is surrounded by air, or is in contact with bodies of a heat less than its own; and hence its energies are almost constantly tasked to supply the expenditure of animal heat, that is, of heat evolved by the very conditions of animal existence. It must, at the same time, be very obvious, that in the large power of self accommodation to the various changes from without, possessed by the animal economy, and by which it can tolerate the two extremes of cold and heat, much will depend on habit in regard to our sensations. If, for example, after being accustomed to an average temperature many degrees less than

that of our bodies, we find ourselves in a medium of 98°, although by the laws of the equalization of caloric, we do not actually receive any of this fluid, yet we experience, nevertheless, decided sensations of heat, and complain of its unduly stimulating us. The explanation of this fact is found in the circumstance of our having been habitually losers of caloric, which had been abstracted from us by the cooler air in which we lived; whereas now, there being no such drain, the caloric is accumulated in our systems and gives us the sensation of heat. The same rule applies even when we are placed in an atmosphere many degrees cooler than our own bodies, provided we have been long accustomed to one of a still lower average temperature. Every reader will find an example of the relative nature of our sensations of heat and cold, in the opposite complaints of two travellers who meet midway up a mountain; the one, ascending, complains of the cold, the other, descending, suffers from heat.

The inhabitants of what are called temperate latitudes, and still more those of the United States, which have what Buffon appropriately calls excessive climates, experience the periodical renewal of their susceptibilities to heat after the intervention of severe wintry cold. Hence it is that in our own natal soil we are, each summer, in somewhat the same situation as an inhabitant of northern Europe would be, who goes for the first time to the West Indies: viz. liable to fever, the direct product of excessive heat and impure air.

In addition to this cause of varying sensations of heat and cold, there is another one inherent in the living body, and depending on its ability to evolve or

secrete caloric. The same individual who to-day finds the air out of doors pleasant, and of a grateful warmth, will, to-morrow, complain of feeling chilly in precisely the same temperature, if, during the night, he have suffered from depression or exhaustion of the nervous system, on the energy of which, together with that of the sanguiferous system, the secretion of caloric more particularly depends. Thus differently impressed at different times with air of the same temperature, he cannot fail to be variously affected with water of the same coldness or heat, provided his system have undergone a change in the period between the two bathings. Even parts of the same body will give rise to different sensations. If the two hands, for example, after having been one in cold and the other in hot water, be immersed in tepid water, this fluid will seem warm to the former and cold to the latter.

These truisms are not sufficiently attended to by those who make their own sensations the standard for advising their friends in the use of the bath; or who think that the experience of one year or portion of their lives is available in all coming times, without regard to intervening sickness or exhausting labour. In making air the subject of our illustrations of the effect produced on the living body by different temperatures, we must bear in mind, however, that the fluid acts not merely on the skin as the sense of touch, and through it on the nervous system, but also on the air cells and lining membrane of the lungs. Of course the surfaces to which it is applied are more extensive and diversified than the skin alone on which water acts. This would at first view seem to explain the fact of our being more excited by moving in and breathing air of 98° than water of the same temperature: but the

reverse state of things does not follow: we are not more depressed in air when the thermometer is at freezing point than in water of the same temperature: we are in fact not near so much depressed. It is true that the conditions for comparison are not fairly laid down; for, while we speak of exposure to a warm or cold air, and the effects attending each, we mean simply exposure with our clothes on, which, as bad conductors of caloric, must modify greatly the experiment; whereas, in reference to our contact with a watery medium, we of course understand its direct application to the naked skin.

To make the comparison complete, we should only expose the skin to air of the same temperature with the water in which immersion is to be practised, and breathe in an atmosphere of a different temperature. When this is done, we still discern that the sensations produced by the contact of the water are much stronger than those furnished by the former. This would seem to depend on the general principle that bodies are good conductors of caloric in proportion to their density; and hence, that if we apply our hands to an iron plate, a marble slab, and a mahogany table, which have not been exposed to either sun or fire, we shall have a feeling of coldness much greater in the two first cases than in the third, even though, by the thermometer, they are all of the same temperature. The reason is, that the marble, and still more the iron, abstract rapidly, by their great conducting powers, the caloric from our hands. The same law applies to water, which, as a denser body than air, is a superior conductor of caloric or the matter of heat, and produces on the animal economy, impressions of a more distinct character than the latter.

If a person be in air of 70° F. there will be an ab-

straction of caloric, but so small and gradual compared with its abundant evolution in the different organs, that there will be no unpleasant sensation experienced. But when, on the contrary, the same person is immersed in water of 70° F. the abstraction of caloric is so rapid and considerable, that the body is required to furnish more than its superfluous secretion, and a feeling of cold is the result. In addition, also, to the difference in the density of the media, habit reconciles us to mutations in the temperature of one, while we cannot be expected to have those opportunities of frequent exposure by which we would become accustomed to the other.

When we speak of our sensations in passing from one medium to another of a different temperature, we ought to be aware of the actual differences in the heat of the different parts of our body, and the consequent shades of feeling of either heat or cold in them, until there is a perfect equilibrium established. It is only then that we can judge with any degree of accuracy of the full and uniform effect of the medium, whether ærial or aqueous, in which we may happen to be at the time. Thus, for instance, water of any given temperature applied to the feet or hands, which are of a temperature of about 90°, conveys a different sensation to what it would do when applied over the abdomen and about the groins, where the heat is 96°, or to the axilla, where it is 98°. We experience also different feelings according as we expose to air or water a part of the skin immediately over a particular organ, as of that over the stomach, or the heart, or the kidneys, each of which is impressible in different degrees, independent of the precise temperature of the outer surface or skin. We may immerse our hands in water which we should, while doing so, call milk

warm; but which after we had plunged the entire body in, we should declare to be cool, if not cold: so, for the same reason; we hardly know how to define our sensations on entering a bath of 92° or 93° : it at first feels to our extremities warm and pleasant, but hardly produces this effect on the central parts of the body; and we are, finally, constrained to acknowledge, after a short stay in it, that we sometimes feel a slight creeping, an approach to coolness; at least this is my own experience. Others may select a lower temperature to illustrate the same idea. During this time, an equilibrium is being established between the water and the body immersed; the extremities lose little or no caloric, but the trunk, being warmer, parts with this fluid: hence the difference in our sensations experienced during the immersion. It would follow, as a necessary inference from this, that when a pediluvium or foot bath is directed to be used, its temperature may, and on occasions ought to be more elevated than would be proper in the case of a general bath. This admission of the inequalities of heat in different parts of the body, the diminution being nearly in the ratio of the distance from the heart, is not however in contradiction to the fact of the power of conducting caloric possessed by the living body. If we plunge our hand into warm water, not only is the hand warmed, but also the whole body; and again, if we immerse the hand in cold water, the whole body is chilled.

Taking into view, therefore, the readily conducting power of water, and making allowance for the irregularities of temperature among different parts of the skin, which varies from 90° to 98° , we need not be surprised that a bath ranging between these two limits should convey a feeling of warmth; while, at the same time, we must admit, that, considering the still greater

heat of the internal organs, these cannot be expected to receive much caloric from, or in other words, be stimulated by water under 96° or even 98° ,—the average temperature of the human body.

The modifications of animal heat, both in respect to its absolute degree and its evolution, as far as dependent on age and season, are worthy of being considered in the present inquiry. It would seem, from the numerous experiments of Dr W. F. Edwards, that the heat of the body is less in tender or infantile than in adult age. The medium heat of twenty adult persons was 97° F.; that of ten healthy infants was 95° F. In an infant born at seven months, the temperature of the body was $89\frac{1}{2}^{\circ}$ F. This difference would hardly justify any general inference, were it not in entire accordance with the results of his experiments on the young of other animals. Dr Edwards found that when these creatures, such as kittens, puppies and rabbits, were separated from their parents, their bodies, which at first were of nearly the same heat as the latter, soon underwent a notable decrease in this respect, so as to be within a few degrees of the surrounding atmosphere. The same result followed the removal of the young of birds from the nest of their mother: and to show that the want of plumage or cutaneous covering had no share in this phenomenon, he took an adult sparrow and cut its feathers close to its body, and then exposed it, at the same time with young ones partially feathered, to air of the temperature of $64\frac{1}{2}^{\circ}$ F. The grown bird preserved its customary heat of $100\frac{1}{2}^{\circ}$ F. or 36° above the atmospherical medium; the young ones lost their heat rapidly, so as to be at last only 2 or 3° above the same medium. We arrive, therefore, at the same conclusion with the author, that the faculty

in warm blooded animals of producing heat is at its minimum at the epoch of their birth, and that it increases successively on to adult age.

In regard to the influence of the seasons on animal heat, we learn that with the *gradual* diminution of the external or atmospherical temperature, man and most of the warm blooded animals acquire an increased energy of respiration, and power of evolving caloric in their bodies. This power attains its maximum in winter, and declines in summer. A gradual succession of seasons seems necessary to enable the animal economy to accomodate itself to the external temperature. If, for example, a degree of cold come on suddenly in summer, we are taken as it were unawares, since our power of evolving caloric is then at its minimum. In this respect we differ in summer from ourselves in winter, in the same manner, though in less degree, that the young of warm blooded animals differ from the adult ones.

While admitting these facts, we must be very careful not to confound the gradual with the sudden application of cold; or frequent alternations, with a regulated transition from heat to cold. The slow and moderate diminution of nervous excitement by a gradual diminution of temperature accumulates the energies of the system: sudden and extreme cold, on the contrary, not only exhausts the free caloric, but enfeebles the nervous energies, so as to prevent the secretion of this fluid. Dr Edwards assures us, that animals chilled and warmed at different times, though they recover their first temperature, are yet longer in doing so: in other words, the faculty in them of evolving caloric, of course the power of resisting fresh cold, is diminished after each chilling or sudden exposure to cold.

The following is a fact in illustration of the subject. A young man who, during a severe winter when the river Seine was frozen, wished to cross, broke through the ice and fell into the water. He extricated himself from his dangerous situation, and escaped without his health suffering; but for three days afterwards he was tormented with an unremitting sensation of cold.

The temporary application of a high degree of heat, on the other hand, favours its subsequent evolution in the body thus exposed. Hence the best means of supporting great cold is to be previously subjected to high heat; a theory this, the practice of which is exemplified in the people of the north of Europe rushing out from their hot and vapour baths, and rolling themselves in the snow, or plunging into a cold stream. Nor is this belief at variance with the position advanced above of the influence of the summer season, and prolonged heat. Agreeably to a law of the animal economy already mentioned, the effect of the prolonged application of a stimulus, to the extent of producing lassitude and pain, is indirect debility,—the part thus over-stimulated is less able to perform its office, and through it the animal economy, if the part have numerous sympathies, is also enfeebled. Now the skin, from its extensive surface, the abundance of nervous expansion entering into its composition by its being the sense of touch, and of course intimately connected with the brain and nervous system in general, its sympathy, and indeed continuity with the inner membranes of the lungs and alimentary canal, by which respiration and digestion are performed, must, in its varying states, powerfully influence the condition of the whole living body. When stimulated

by heat or hot air, the excitation of the skin is felt by the entire nervous system and brain; the functions of which, together with the circulation and respiration, are also hurried. If this state of general, following cutaneous excitement be sudden and violent, from exposure to the sun's rays, we have the phenomena of sun stroke; the most marked characters of which are excessive fulness of the vessels of the brain, and a burning heat about the region of the stomach and of the skin. So acrid is this heat, that to the touch of another person it is actually painful. Now, in this state of things, the nervous and blood-vessel systems are both highly excited, especially where they are diffused like a fine net work over and through the membranes, both internal, as the lungs and digestive canal, and external, as the skin. One characteristic effect of this excitement is the evolution of animal heat or caloric, which is often so great and excessive, as to render it impossible for us to restrain it by cold affusions externally, and by cold drinks and cold injections internally. Cloths dipped in ice water, applied over the stomach and to the head, are soon made warm, as if wrung out of hot water. This morbid state persisting, the sudden and fatal effects, not only from indirect debility, but from disorganization of parts, ensue, and death closes the scene.

Here we have a notable example of heat so stimulating the skin, and through it the nervous and blood-vessel systems, as to give rise to an excessive evolution of caloric; in other words, of heat creating heat, and rendering the body almost insensible to the operation of cold freely applied in the manner already mentioned. The main peculiarity to be remembered, in the application of the heat in this case, is its suddenness and

intensity. Should the individual, however, who has been seized with a sun stroke, recover from the accident, his nervous and vascular systems, over-excited at the time, and evolving an inordinate amount of caloric, will subsequently fall into a state of indirect debility and of comparative exhaustion, accompanied with a minor evolution of caloric; and so far is he, in the second stage, from being insensible to extreme cold, as he was in the first, that he cannot tolerate the common atmospherical vicissitudes from warm to cool, without shivering and complaint.

The effect of prolonged summer heat is identical in kind, but merely differing in degree with that of the intense action of the solar rays just described. At first, it powerfully stimulates,—afterwards, the parts thus stimulated are worn down by continued effort, and perform their functions with less energy. Among these functions is that of calorification, or the evolution of heat, which is less than before. Add to this the excessive transpiration from the skin and lungs, and the consequent coolness by evaporation, and we can understand why the faculty of evolving heat should be diminished in summer, and that this diminution, together with less ability to resist cold, should be most evident the more the summer is advanced.

With the gradual approach of winter, that is, with a gradual diminution of atmospheric heat, there is less stimulation and exhaustion of the vital functions; and during the prevalence of the cold season, these functions acquire their maximum of activity. There is, it is true, an expenditure of caloric by the colder external air, but this is not equal to the quantity generated in the animal economy. The absence or minor degree of cutaneous transpiration or sweat, at this

season, prevents, also, that waste of caloric by the skin, which takes place so largely in summer. The refrigerating effect of this process is readily perceived, when, from any cause, perspiration is arrested. The skin then becomes hot, and the internal sensations greatly augmented. But the argument in favour of these effects of diminished temperature rests entirely on its gradual application and moderate degree. For, if sudden and excessive, cold directly enfeebles and paralyzes the nervous and vascular systems, and prevents, and finally destroys, their power of evolving caloric. The skin, when thus exposed to intense cold, becomes pale and shrunk, the senses and the mental faculties are dull and obscure, respiration, at first irregular, is eventually slower, the tongue is pale, and thirst, if it prevailed before, is entirely gone; the disinclination to motion is extreme, and a drowsiness, gradually increasing, ends in torpor and stupor. It is the winter sleep of a class of animals, such as reptiles and some of the mammalia and birds; but if indulged in by man, and most of the warm blooded animals, it is in them the sleep of death. The human body then becomes obedient to the general laws of the equalization of temperature, and it is an inert frozen mass, like the objects around it. Nearly every severe winter, in middle and northern latitudes, gives examples of unfortunate human beings thus perishing from cold, the morbid effects of which are greatly augmented and accelerated by primary feebleness of constitution, long fasting, fear and despair, and drunkenness. But the most numerous and melancholy records of this nature are to be found in the history of a winter campaign, or the forced retreat of an army in an enemy's country. In these cases of congelation, the cold of the atmos-

phere acts both on the lining or mucous membrane of the lungs, and on the skin. But the same effects will result if excessive cold, by immersion in cold water, be applied to the skin alone, just as in the instance of sun stroke, the morbid operation of heat on the animal economy takes place through this part. To the skin, therefore, ought especial attention be paid, whenever we would lay down maxims for the preservation of health, and the cure of disease.

In many persons this tegumentary covering is so habitually sensitive, that the slightest mutations of temperature of the external air are productive of disturbance in the nervous system, and other painful effects. In them the vernal sun irritates and blisters, and the autumnal coolness chills and renders pale. The activity of their functions is not great, and the power of evolving caloric correspondingly feeble. Of course they feel very sensibly the smallest expenditure of this kind of heat by exposure to diminished atmospheric temperature; they are said, in common language, not to be able to bear cold; they demand and require much clothing, and a regulated artificial heat. On the other hand, provided their skins be protected from direct exposure to the sun's rays, they revel in the heat of summer, under which those of a vigorous and athletic frame and sanguine temperament feel as if they were being consumed with fire. Persons of this last class, with ample chests and full and active respiration, whose muscles are largely developed, and nerves and blood-vessels liberally distributed, and in strong functional exercise, have, of course, their organs of calorification correspondingly strong and active. The habitual evolution of caloric is great with them, and they can illy tolerate increase of the process by ex-

ternal heat. On the contrary, they bear with pleasure an expenditure of caloric by means of atmospheric coolness, and in lieu of this, by means of a cold bath: they can bear even such a degree of cold as shall not only exhaust the free caloric as rapidly as it is evolved, but which also shall temporarily diminish the activity of the organs themselves from which it is given out.

Such is the difference in respect to toleration of atmospherical extremes and vicissitudes, that the cold which, to the robust and sanguine, is grateful, would be to the sensitive and feeble a depressing agent, to resist which would require a continued struggle by the functions of the animal economy, ending too often in distress and disease. These two classes of persons differ as much in what we may call appetency for cold, and ability to endure its effects, as two individuals, the one just in that state of chill preceding a shake of intermittent fever, and the other in the hot stage of the disease. Immerse the first in a cold bath and he may not come out alive; plunge the second in one, and his mind, from being delirious, is calm and rational; the burning heat of his skin, panting, respiration, and hurried pulse, are succeeded by natural coolness and regular breathing and circulation, and an absence of the inextinguishable thirst with which he had been tormented. This person, as far as regards morbid heat, resembles the man who had received a sun stroke, and is relieved by similar means. We see, in these examples, proofs of the extensive sympathies of the skin with other parts of the animal economy, and consequently of the influence which it exerts over them in health and disease. The direct effects of diminished temperature and dryness of the skin, when the body was immersed in a cold bath, is

attended by a corresponding and prompt change, in these respects, in the membranes lining the lungs and digestive canal. The breath, before hot, in consequence of the highly excited state of the pulmonary mucous membrane, is now of the common warmth, the internal heat, especially felt in the region of the stomach, and the urgent thirst are gone; and the tongue and mouth and throat, before red and parched, are become of a paler colour and moist. All the mucous membranes have lost their former dryness, heat, and morbid vascularity, so soon as these conditions of the skin were removed by the application of cold water to it.

But the skin, thus prompt to transmit curative impressions to the internal surfaces and organs, is equally so in calling these parts into sympathy when it is affected by morbid causes. Thus, if it have been long excited and perspiring, so as to be thrown into a state of indirect debility, or if it have been enfeebled by the prolonged operation of cold, it becomes exceedingly susceptible to the impression of a moist cool air, or moisture partially applied, as to the feet or other parts of the body: hence arise dyspepsia, catarrhs, rheumatism, pleurisy, &c.

The sympathy between certain portions of the skin and the internal organs is worthy of attention. When these latter are diseased, we sometimes have the skin of the extremities morbidly cold, at other times burning hot, without the rest of the cutaneous surface being always different from its common temperature. In certain fevers, the skin of the epigastric region, or that over the stomach, conveys to the hand of another person a sensation of the most acrid heat, while perhaps that covering the limbs is little changed in this respect. The skin lining the inside of the upper and

lower limbs, and covering the side of the chest and abdomen, and along the spine, is warmer, and has greater delicacy of touch than in other parts. But there is no invariable connexion between temperature and tactile power or touch, since we find that the skin of extremities is generally a few degrees cooler than that covering the trunk, though the delicacy of touch is incomparably superior in the former to what we find in the latter. As a mere sense, and, of course, as connected with general sensation and volition, impressions on the skin have the most powerful effects in rousing and exciting, when made on the extremities: hence the benefits derived from stimulating and irritating applications to these parts when we desire to rouse the nervous system, and restore it to its accustomed train of action, as in cases of fainting or insensibility, stupor and the like.

As regards the connexion between the organs in the cavity of the chest and the skin, we find that impressions made on that portion of the latter lining the arm and covering the side below the axilla, have a strong influence on the lungs and heart. Exposure of this portion of the cutaneous surface, common in children and females, from the absurd style of dressing, is a frequent cause of catarrh, croup and pleuritic stitches. If, on the other hand, we desire to produce a salutary derivation from the chest in chronic diseases of the lungs and heart, we have scarcely a better means than to apply a blister to the inside of the arm just below the axilla, and keep it discharging. I have found more benefit in organic affections of the heart from this than from any other course of treatment. Between the skin lining the inside of the thighs and covering the inguinal regions, and the abdominal vis-

cera, there is also a very intimate sympathy. Where there is much susceptibility of the former to disease, the latter should be well protected in both sexes by warm drawers. Every intelligent physician is aware of the influence exerted over the genital and digestive apparatus by the application of blisters to the inside of the thighs.

When we reflect on the great number and variety of diseases, which directly originate in suppressed perspiration and atony of the skin, we feel naturally alive to the best means of preventing a state of the system so productive of disastrous effects. These means are threefold:—first, by clothing; secondly, by the gradual and systematic exposure to the atmospheric air; and thirdly, by the use of baths of suitable temperatures. These three modes are closely connected, since we cannot well speak of the effects of one without having all the data furnished by the others.

Of clothing. Our remarks in this place will be chiefly on the kind of clothing to be worn next the skin. The use of flannel in cold and variable climates has been very generally recommended as the best means of protection for the inhabitants against the effects of extremes and sudden vicissitudes of temperature. There are not wanting, however, physicians of experience and observation who reprobate the practice as effeminate and debilitating, and productive of some of the ills it was intended to cure or prevent. By analysing these contradictory opinions, we discover that when authors come to explain their views in detail, there is actually less discrepancy than at first appears. The use of a flannel shirt next the skin throughout the year—winter and summer—night

and day, has been declared to be inimical to health, and certainly, as a general practice, even among invalids, is not to be recommended. The body, thus constantly stimulated by a woollen garment, no longer derives that protection in extreme and sudden states of cold and moisture which was promised for it. In summer, it increases unduly the discharge of sweat, already too great by the mere heat of the season, and thus contributes to throw this part into a state of languor and debility, which illy prepares it for the wintry cold. There are, moreover, persons whose skin is so habitually hot and sensitive, as not to tolerate the application of flannel to this surface. Sometimes, cutaneous eruptions forbid its use, since they are either kept from being cured or are aggravated thereby. At other times the sensations of inward heat and thirst are augmented by the irritation of the skin maintained by this cause; hence, in febrile diseases, the physician most generally allows the patient to discontinue the flannel. The manner in which a woollen garment produces its effect is twofold,—1. By numerous points it acts, as it were, the part of a flesh brush, and keeps up a mild irritation of the cutaneous surface. 2. By its being a bad conductor of caloric, it preserves the temperature of the body at nearly a uniform degree: it prevents, in cold weather, the escape of the animal heat into the surrounding air, and in summer, or when the body is exposed to the sun's rays, it prevents the transmission of the external heat of the air to the skin. Woollen cloth is, moreover, a bad absorbent, and its interstices not being close, its pores are freer for the passage of the various exhalations from the skin, so that evaporation from this surface is not arrested, and it remains cool. This

last property is of course only to be expected in flannel which is not very fine, and in that which has not been fulled as it were, and made thick and hard by repeated washings.

According to these views, a person may be allowed to dispense with wearing flannel, whose circulation and vital functions, generally, are vigorous, and whose skin is habitually warm, that is, develops animal heat largely. This state of things does not necessarily imply, though it is often accompanied with robustness of frame. Where, on the other hand, the circulation is languid, the skin, and especially that of the extremities, frequently cold, and digestion slow, flannel is of the first necessity during nearly eight months of the year in our climate. Independently of these considerations, if the employment of a person be such as to expose him to sudden transition of temperature, as in rushing from a hot workshop or foundery to the open air, or if the labour or exercise out of doors be otherwise so excessive as to cause sweating and fatigue, without the possibility of change of linen, dry rubbing and passing into a warmer medium, then had flannel better be worn. But in none of these cases is it necessary to wear it during the night in bed, provided a person be furnished with sufficient covering, and be not frequently required to go out into another apartment, or into the open air in a hurry, without due time being allowed for putting on suitable outer garments.

In a disordered state of the body, as in catarrh, asthma, rheumatism and bowel disease, it is necessary that flannel should be worn next the skin; at least the omission would be attended with risk. It is almost impossible to procure permanent relief from these and

various other maladies without the functions of the skin, and of course its equable temperature, being properly sustained. For this purpose flannel, as the inner garment, seems well adapted; but to be completely so, its use must be accompanied with the following conditions: 1. That it be regularly and at short intervals changed, its use during the night, with the exceptions already indicated, being dispensed with. 2. That it be not tight to the body, nor of a texture firm and thick by much washing. 3. That friction of the skin with a coarse towel or flesh brush be practised night and morning; and sponging this surface with cold or tepid water according to the season and the temperature of the skin, be had recourse to, before friction, every morning, or at least on alternate days. In cases where the skin is not of uniform warmth and is readily chilled, it will be sufficient to use the sponge well squeezed, and just moist, or perhaps damp, renewing, of course, its immersion in water, and subsequent squeezing several times during the operation of sponging the skin with it. This last condition can be carried into effect by most persons, but there are some who invariably suffer during the colder months, from even sponging their surface with water of the temperature of the air, or under the degree of decided warmth. To such, a warm bath twice a week will be advantageous. But we are anticipating in this last particular, and shall conclude the subject of flannel clothing by noticing some of the objections brought against its use.

It is alleged that the wearing of flannel is apt to cause excessive and exhausting perspiration; but this objection can only apply to the practice being continued during the summer season or in hot climates.

Flannel is also said to render the skin too delicate and susceptible to changes in the weather. Now this argument is founded upon a false theory, which supposes that an uniformly sustained temperature enervates, and that to bear cold, we must be much exposed to it, than which, as has been already shown, nothing is more fallacious. If the stimulus of the flannel be called for by any of the circumstances already mentioned, any excess of stimulation or of heat of the skin, in consequence, is readily prevented by discontinuance of this kind of garment at night, when the person is in bed, and by the practice of sponging, as just directed. In this way also is the body safely inured to changes of temperature, to which it must, of necessity, be exposed in the various concerns of life. Excessive irritation of the skin, or even cutaneous eruptions in persons where this part is very sensitive, may be obviated by lining the flannel with fine muslin. This is a preferable plan to wearing the flannel over the shirt, and may be had recourse to in all cases where, at the same time in which we want to guard against sudden transitions of temperature, we would avoid the inconveniences attributed to flannel next the skin. The objection made to flannel on account of its being so long worn without change, applies, not to the article, but to neglect of personal cleanliness: and it is also urged under the supposition of the use of it being unremitted during summer, and at night when in bed. If, from particular causes, a flannel garment be worn at night time, it ought to be replaced invariably by another in the morning, and the first hung up to air during the day. When I recommend that it should be dispensed with by a person in bed, I ought to add that it is often proper to wear at this time a jacket with

sleeves, made of coarse muslin, under the common shirt and next the skin, in place of the flannel. This substitute is the more necessary to invalids who are liable to be alternately chilled and sweated in the night, and on whom the flannel would be more apt to produce this last effect. I may add, that, even the robust, who disdain to wear flannel at all, would find their account in wearing the muslin jacket with sleeves, under their linen shirts, if they are much given to athletic exercises, or readily excited to sweat. In the summer season this will be found a good substitute for the flannel which had been worn next the skin during the winter.

On a review of what has been said in this chapter, we find that:

1. The skin, with a superficies in an adult of about fifteen square feet, consists of three laminæ, the outer one hard, and in a measure horny; the second and middle soft and pulpy; the third and inner firm and resisting, with a great many fine vessels and nerves spread over it after having penetrated it from the fatty and cellular tissue beneath.

2. From the cutaneous surface is secreted and exhaled different gases, the chief of which is carbonic acid gas or fixed air, a watery vapour or insensible perspiration, and at times an aqueous fluid, holding salts in solution, and constituting what is called sweat: from small bodies or glands there is also discharged on particular regions of the skin an oleaginous fluid. The skin absorbs or allows to pass through its pores various gases, the chief of which is oxygen gas, and also watery vapour.

3. In addition to its other offices of supply and discharge, the skin is also the seat of the sense of touch,

and as such is connected with the brain, and other senses, by a variety of relations.

4. Acting by a well established law in physics, the skin is a surface for evaporation and consequent cooling.

5. This tissue is continuous in the various openings at the eyes, nostrils, lips, &c. with the membranes lining the eye-lids, and those on which take place the senses of smell and taste ; also with those continued from these parts down into the lungs in one direction, and stomach and intestines in another, and on which take place the chief phenomena of respiration, and of the different stages of digestion. In another direction, the skin is continuous with the mucous membranes lining the organs peculiar to each sex.

6. The sympathies of the cutaneous tissue with these internal membranes, must, *à priori*, seem evident, as well from the general sameness of structure as from community of office—the skin exhaling and absorbing vapours and gases like the lungs, and fluids like the digestive canal. But not only does it sympathise with these, but with other membranes of the serous class, such as that investing the lungs, and the one covering the abdominal viscera; also, that variety lining the joints, &c.

7. The influence of the skin over the animal economy must be manifestly great, and of course the operation of the agents, by which it is impressed, ought to be familiar to us. These act in two ways. 1. By exciting or diminishing its nutritive functions of absorption, and secretion and excretion; and, 2. By increasing or diminishing its sensibility and sensations.

Bathing affects it in all these ways: by softening the cuticle or outer hard lamina of the skin, a more

ready entrance is afforded to water and other fluids, and by subsequent friction, this part more readily peels off, so as to leave the skin more delicate for the discharge of its various functions : in addition to this, baths by their temperature acting on the sentient extremities of the nerves, and the minute blood-vessels blended with them, will either accelerate or retard the functions, according as the medium in which the body is immersed be hot or cold.

8. Simultaneously with these changes in the functions of the skin, or immediately consequent upon them, will be changes in the nervous system in general, and in the circulation, respiration, digestion, and various secretions, by the links and means already designated.

9. The effects of bathing are relative to the temperature of the fluid and that of the living body to which it is applied.

10. The medium temperature of the human body is from 96° to 98° Fahrenheit. The warmth is less at the extremities than in the central parts of the body, so that in this respect there is often a difference of 6° or 8° between the hands and the arm pit, even when the former do not feel at all cold to their possessor.

11. Although our bodies are, in degree, obedient to the laws which govern the transmission of caloric in the material world generally, yet we have, obviously, independent sources of heat, and means for preserving an equilibrium of the animal temperature.

12. The air in which we live being almost always of a lower temperature than that of the body, there is a constant evolution, and discharge of caloric from the latter into the former. This loss would become excessive in low temperatures, but for the covering of the skin, which is a bad conductor, and the protection

afforded by clothing of woollen, or furs, which are also imperfect conductors of heat.

13. In the winter season, and in cold climates, the digestion is more vigorous, respiration fuller and complete, and nutrition more active; there is, in fine, an activity of all the organs of internal life, by which caloric is secreted. The absence, in a great measure, of sensible perspiration, or sweat, prevents the loss of heat by evaporation, and the skin from being such a good conductor as in the opposite state of things.

14. The excitement produced by living in air of an elevated temperature, is moderated by the increased cutaneous secretion, or sweat, and consequent evaporation.

15. Our sensations of heat will mainly depend on the proportion between the formation of caloric in the organs of the animal economy, and its expenditure by the surrounding air and inert substances with which we are in contact.

16. Habit, reconciles us to a wide range of atmospheric temperature. Cold air, unless so extreme as to benumb the nervous expansions of the skin, and enfeeble the nervous energy and functions generally, and hot air, equal to, and sometimes exceeding the medium temperature of the body, unless perspiration be suppressed, are both well borne. In both the average heat of the body remains the same.

17. The exhausting effects of cold, always readily felt at the extremities of the body, must be obviated, by attention to all the means, already indicated, for giving energy to the system, or in other words, increasing the action of the minute vessels and nerves of the organs, by which caloric is evolved.

18. The more vigorous the circulation and nervous energy, the better can cold be borne. External heat, then, by exciting the functions, and contributing to the evolution of animal heat, enables us the better to resist cold. This must be understood of the equable operation of external heat, and its not being continued so long as to exhaust the minute vessels of the skin by copious perspiration, and of other parts by abundant discharges.

19. The medium temperature of the body is less in infancy and old age, and the ability to resist at these times the exhausting effects of cold is also less.

20. Inordinate heat of the body is felt when the cooling processes, by perspiration and evaporation, are checked. It then becomes necessary to moderate the excessive action of the organs of the body, from all of which the caloric is evolved. This is best done by cold applied to the skin, or by means of cold drinks to the stomach, and cold injections into the intestinal canal.

21. Our sensations of heat and cold vary, according to the conducting power of the substances applied to our bodies, and the suddenness of the change in the temperature of the medium in which we are placed.

22. Unaccustomed as we are to immersion in a watery medium, added to its ready conducting power, prevents us from experiencing any very decided sensation of warmth in a bath of less temperature than that of the human body, or at least, of its extremities.

CHAPTER III.

Division of baths.—The most important varieties are the cold, warm and hot.—Modifications depending on the general or partial application of the fluid for bathing, and also on its chemical qualities, and the ingredients it holds in solution.—Distinctive effects of the cold, warm, and hot baths.—Vagueness of ideas attached to the terms cool and tepid, as applied to baths.—Vapour baths—varieties of, simple and medicated—dry and moist—partial or general.

THE most simple and natural division of baths, that recognized by our sensations, and most applicable to the purposes of hygiene and of medicine, is into *cold*, *warm*, and *hot*. The intermediate degrees between positive cold and warmth, are vaguely expressed by the terms cool and tepid; but for all practical and available purposes, it will be sufficient to include the first of these, or cool, under the distinct head of cold; while the second, or tepid, will be classed with that of warm. Baths receive different names, according to the chemical difference in the fluid; hence we have sea and vapour baths. These are also variously named, according to the part of the body to which the fluid is applied, and the mode of its application. Thus we have a *semicupium* when only the lower half of the

body is immersed ; a *pediluvium* or foot bath, and so on. The application of water, or any mineral or medicated fluid by means of a small canal or pipe, is called *sposit bath* or *douche*.

As the sensations of heat and cold are in a measure relative, being modified by sundry causes adverted to in the last chapter, it is desirable that we should have a point of departure, a standard, as it were; by which every individual can judge of the first effects of bathing. What some shall call cool, others will allege to be tepid, and to some the tepid will feel warm. But there is a boundary at which all difference of opinion depending on feeling ceases; it may be called that of invariability of temperature, and corresponds with the animal heat. This last is, with slight differences, every where the same; and a watery fluid of this temperature will impress every person immersed in it in very nearly a similar manner. A bath of 95° to 97° of Fahrenheit will, both by the Laplander and the intertropical African be called warm. It will be grateful to their feelings and soothe them nearly alike. It is precisely that degree of external stimulation, or less theoretically speaking, that amount of impression which is most congenial with the wants of the nervous system. It is alike removed from enfeebling depression or perturbing excitement, and places the animal economy in a state of quietude most favourable to a correct balance of all its functions. In fixing the above as a positive standard to which the experience of all mankind will conform, we are not, however, excluded from allowing a somewhat wider range to the warm bath. We are the more justified in this, not only from individual dif-

ference of animal temperature, it being lower in some than in others, but also from the average heat of the skin, and especially of the extremities being some degrees lower than the blood and internal parts of the body. Hence, a bath of 92° to 94° , as of a temperature equal that of the extremities and most of the external surface, will at first feel warm, and to some will continue to convey the sensation. But, as already mentioned, we believe, that after a short immersion in it, there will be a slight feeling of uneasiness, or at least want of the complete and diffused sensation of warmth. For, while a very small part of the surface shall crave more warmth, there will not be a feeling of entire comfort; whereas the application of a fluid sufficiently warm for this circumscribed part will not be ungrateful to other regions of the skin of a lower temperature, provided always, that the bath be not above the point of animal heat. These remarks apply to the common healthy condition of the animal economy, where the evolution or supply in the system and discharge or loss from the skin take place with regularity. In other conditions, as where the skin of an individual feels to himself habitually hot, where it has been thrown into a state of excitation by active exercise, short of sweating and fatigue, or by stimulating drinks and medicines, then the evolution of caloric being excessive, a bath of even a lower temperature than that mentioned above will be called warm, because it will not exhaust or convey off the caloric so fast as it is formed. These persons, immersed in water of 90° , or even 88° , may call it warm, at least they will declare that it conveys no sensation of chillness or coolness. But, if we have regard to the

declaration of a large majority of those who have recourse to the warm bath for hygienic purposes, and who retain their healthy sensations, we are safe in taking 95° of Fahrenheit as indicating the temperature of this kind of bath—and if we take the space of six degrees, three above, and three below this standard, we shall have a sufficient latitude, viz. from 92° to 98° for the warm bath, and every reasonable adaptation, within these limits, to individual peculiarities, whether of animal temperature or sensibility. If an extension of the scale be thought necessary, experience and authority agree in making it downwards, that is to say, as low in the thermometer as 90° , but in very few cases, indeed, could an extension upwards, or above 98° , be admitted, consistently with the general indications, for using the warm bath, or the effects which follow its use.

Immersion in water, of a temperature ranging a few degrees below 92° or 90° , if we admit this latter to be as the lowest limit of the warm bath, gives rise to no very decided sensation. It constitutes a tepid bath, which some call pleasantly warm, others cool, or which agreeable on first immersion, will, after a few minutes stay in it, cause feelings of occasional creeping and discomfort. Its use is not to be denied, in particular cases, as a remedial agent, but we can seldom speak with any certainty of its hygienic operation, or effects on healthy persons, other than as far as it is instrumental to the general purposes of ablution, without imparting the shock to the human body which it receives from the cold bath. The want of definite ideas, attached to the term *tepid*, is unfortunately too

common even among medical men,* and its vagueness in the minds of other persons of the community is evident enough, if we ask from a few individuals for lukewarm or tepid water. Each, according to his absolute, or even temporary sensibility, has a different notion of this kind of temperature. We may estimate as the probable representative of the tepid bath, water of a temperature between 84° and 90°, or 92° Fahrenheit, but we cannot, as in the case of the warm bath, take a specified degree, respecting which there shall be a general, if not universal, accordance of opinion; that is, of opinion directly deduced from sensation.

Equal difficulty is met with in an attempt to separate, in a marked manner, a cool from a cold bath. In both there is more or less of a shock felt, at the moment of immersion: and if we are to recognize a difference, it will mainly consist in the circumstance of the bather being soon accustomed to the cool bath, owing to his moderate loss of caloric, and his even ceasing, after a minute or two, from complaining of any unpleasant feeling of chillness; whereas, in a true cold bath, the body is in a continual struggle to resist the strong exhausting agency of the medium in which it is immersed; and the feeling of cold, though in a vigorous person it may cease to be painful, is, never-

* "I apply," says Currie, "the term *tepid* to water heated to that degree which is warm, but not hot to the sensations, and which in the way of affusion, is from 87 degrees to 97 degrees of the scale of Fahrenheit." This estimable writer, in an apparent desire to vary his language, has singularly obscured our ideas, on the very point respecting which he proffers explanation. In other parts of his work, he makes use of tepid and warm as synonymous terms—as when he tells of his prescribing, "the tepid bath (from 92 degrees to 96 degrees)," in scarlatina.

theless continued, and in a measure uniform in its direct effects and phenomena. A good illustration of the effects of *cool* bathing is presented to us in the instance of the Buxton water in England. This is of a temperature of 82° Fahrenheit, and although at the moment of immersion there is felt a shock of cold, this is soon succeeded by a rather pleasant and soothing sensation, amounting at times to a glow over the whole body.* Such a bath might, however, be considered as near the upper limits of cool, although I have myself experienced a decided sensation of cold and shivering, or real shock, on going into a bath of 84° Fahrenheit, the temperature of the air being also 84°. A favourable specimen of the cool bath, for habits not much enfeebled, and tolerably well balanced functions, is presented in the Sweet Springs, and at Bath, Berkley, Virginia, &c. The temperature of the water is about 74° Fahrenheit. The shock to the bather is very sensible, and in some too enduring to be pleasant, whilst others, even in advanced

* The discrepancy of language, to express the same state of fluid, or kind of bath, is vexatiously exhibited, when we contrast Currie and Saunders, both authors of merit. "By the term *cool*," says the former, "I indicate the temperature from 87 degrees to 75 degrees." Now, 87 degrees represents tepid as nearly as may be,—a tepid bath, which we have seen in a former note, this author considers to range 10 degrees higher. Saunders speaks of Buxton as celebrated for its warm spring; and again tells us, that "its temperature in the gentleman's bath is invariably 82 degrees, which, therefore, entitles us to consider Buxton water as a *thermal* spring, though but low in the scale of these natural waters." Now, both of these terms, which I have italicised, are wrongly applied, and must increase the difficulty of correct classification. Saunders's warm and thermal come within the range of Currie's cool bath, and the limit assigned by this latter to cool, will include by several degrees what is called warm by the former.

life, after a short delay in it, experience rather agreeable sensations.

In a bath of 70° and under, there will be a pretty general sameness of sensation experienced by those using it. The shock will be evident, and there can be no hesitation in our designating it as cold. The spring water of every country furnishes a bath of this kind to the inhabitants, although there be a range of thirty degrees between the two extremes, as we find it in the northern climate of Europe, and in the West Indies. In the former it is 40°, in the latter as high as 70°. In Pennsylvania, the cold bath of our springs is about 52° Fahrenheit. Now, all persons, no matter in what country or climate they may have lived, or by what peculiarity of temperament and constitution distinguished, whether they be in a state of health or disease, will immediately, and with one accord, acknowledge experiencing nearly the like sensation on immersion in such a bath. There will be no difference of opinion among them, as to its being cold.

It would seem, therefore, that among the kinds or varieties of watery bathing of which we have just spoken, the only ones productive of distinct and universally recognized sensations, are the cold and the warm. Of these we can speak to one another, with the conviction that we shall be readily understood, when directing them to be used. But, if the first sensations, in a bath beyond the degree of pleasurable, and what, in reference to animal heat, we may call natural warmth, be not so clear as we could wish; and if some are found speaking of such a bath as quite warm, or very warm, there are still certain obvious effects, and which serve as symptoms that ought to guide the

most unwary and inexperienced. These are, acceleration of pulse, augmented and preternatural heat of the skin, felt especially in the cheeks and temples, and some fulness of the head, and slight confusion of thought. As these effects are unpleasant, and in delicate habits and invalids to be especially deprecated, it is necessary to draw on general experience, in order to prevent the risk of individual experiment, and to give, in advance, such cautions as shall prevent their occurrence. On data, furnished by these means, we have discovered, and affirm it as a truth, applicable to the large majority of the human species, that immersion in a bath above 98° , produces the phenomena already described. In other words, it displays the stimulating effects of heat on the animal economy, and is to be used with that reserve which so powerful a stimulus as high heat indispensably requires. The line of agreeable warmth is past, and we are, when immersed in water above 98° , in a *hot* bath. If any distinction between different varieties of baths be of practical importance, and conducive to comfort and health, and to the cure of disease, it is that which ought to be made, and to be generally understood, between the warm and the hot bath. Much of the disrepute into which warm bathing has fallen, and most of the erroneous conceptions respecting its hygienic and medicinal powers, have originated in an oversight of this distinction, and in confounding two agencies and modes of impression, the effects of which differ from each other in a most marked manner.

Vapour baths are to be regarded as affecting the animal economy in virtue, mainly, of their heat, when they are of the dry kind, and of their heat and moisture

when they are the product of hot or boiling water. They are also susceptible of another division, viz. into *simple* and *medicated*. The first, when they consist of merely hot, dry air, or watery vapour; the second, when holding in solution or suspension, various medicinal substances. The effects of vapour, whether of the dry or moist kind, applied to the human frame, are also greatly modified by the circumstances of its application, that is, whether the whole body be immersed in it, so that it shall be inhaled, and applied to the lining membranes of the lungs, or only to the skin, the head being free, and a direct communication established with the common atmospherical air.

Earth or mud baths act in nearly the same way as moist vapour baths. In the neighbourhood of some thermal springs, the water flowing over and through a swampy or muddy spot creates these natural mud baths, the beneficial effects of which, in gouty and rheumatic diseases, have been attested by very good evidence.

Having thus explained the views which guided me in the classification of baths, I shall next proceed to speak of the effects of each kind.

CHAPTER IV.

Cold bath.—It is not a stimulant nor tonic.—The sedative effects of cold on animals—on man.—Phenomena attending immersion of the body in cold water.—General diminution of function in the nervous and vascular systems.—Abstraction of caloric, and its subsequent minor evolution.—First effects of cold bathing not dependent on the shock.—Increase of cold of the body immediately after coming out of the bath.—Subsequent reaction—the skin not actually warmer at this time than before.—In weak habits, there is no reaction, or it is incomplete.—The cold bath is here directly and unequivocally enfeebling.—Persons with whom the cold bath best agrees.—Pernicious operation of cold on young animals.—Galen's directions for the use of the cold bath sanctioned by subsequent experience.—Bodily infirmities in which cold bathing is serviceable.—The various methods of applying cold water externally, detailed.—Cold ablution or momentary immersion is beneficial in cases of excessive sensibility, not complicated with indigestion; also in the febricula of sedentary persons—and in sanguine and plethoric habits, where the skin is too readily excited to sweat.—The diseases, in which cold bathing has proved ser-

viceable, are those of morbidly augmented action, with increase of animal heat, as in fevers, inflammations, and hemorrhages.—Prejudices retarding the use of the cold bath in fevers.—Its general introduction into the practice of medicine due to Currie.—He mentions the prior use of it by Wright and Brandreth.—Galen had spoken well of, and used it.—The oriental practice in Persia, Abyssinia, Egypt.—Sir John Floyer's work.—De Hahn.—Cirillo.—Samoiowitz's use of frictions with ice in the Plague.—Cold bathing in remittent fevers, by local application of ice or cold water.—Importance of the watery regimen in fevers, illustrated in the Spanish and Neapolitan Schools.—The cold bath in intermittents: it is especially serviceable in the hot stage.—Its use in Scarlatina—Small pox—Measles.—Table of Froelich.—Cold bath in petechial fevers—hemorrhages—inflammations—burns—sun stroke—poisoning from opium and other narcotics—asphyxia from deleterious gases—poisoning with hydrocyanic (prussic) acid.—Cold bathing in convulsive diseases—tetanus—hydrophobia—epilepsy—chorea.—Also in arachnitis—peritonitis—constipation—ischuria.—Cold affusions to the diseased part, as in inflammations of the joints—wounds and ulcers.—Sketch of the history of water as a vulnerary.

It may seem a just subject of surprise that the practice of cold bathing, which is among the most ancient means of recreation and refreshment, and which has ever been received in the medical art as a remedy of considerable power, should still be under the dominion

of fluctuating hypotheses, and be too often resorted to on the faith of the most remote analogies and perverted experience. But our wonder will be diminished by the reflection, that the circumstances under which it acquired celebrity in the eyes of the historical reader, and under which it has been so generally resorted to in all ages and countries, are well calculated to deceive, as to its true character. Cold bathing was a part of the severe physical education of the Spartans, whose endurance of fatigue and privation is proverbial. It was natural to suppose that a national usage like this was one of the causes of that bodily prowess and hardiness which made them the best soldiers in Greece. But, as often happens in other matters, an associated circumstance was too hastily assumed as a cause. The citizens of Sparta were, when occasion required it, all soldiers; few claimed to be exempt from the hardships of a camp life, because few, not naturally hardy, and possessed of great physical powers, could survive the severity of the early discipline of their education. The exposure of delicate and deformed children, a practice strongly recommended by Lycurgus, was the first means of removing those who, in after life, might, through inherent feebleness be prevented from acting the part required of them by their pitiless laws. They, whose infirmities were less evident in early life, would be severely tried by the cold bath, and by a style of garment which was the same amid the vicissitudes of seasons; and it is no forced inference to admit, even if more direct evidence were wanting, that many would sink under a treatment which was not so much a means of making hardy citizens, as of sacrificing the feeble and the delicate. Cold bathing of tender infants, without regard

to constitution and temporary changes of health, acts in a manner nearly analogous to the test of nitric acid on the metallic alloys; if gold be in them, it remains untouched, and is exhibited in its native brightness; the other metals are corroded and dissolved. So with the cold bath, the feeble and valetudinary sink under its use, while the strong and robust are exhibited in a more distinct point of view, and are even benefitted, by their acquiring a habit of endurance of cold, which, when suddenly applied, is so formidable to the health, and generally adverse to comfort. We know that people in the earliest stages of society, engaged in war and the chase, or who lead a pastoral life, and in whom there is found much bodily vigour, induced and sustained by regular labour, and simple aliment, have always been ready to plunge into the nearest stream; and recreate themselves with a natural cold bath: we learn even that the Roman youth, while still panting and glowing with the sports of the Campus Martius, would jump into the Tiber, and thus make swimming succeed to the exercises on land. It is also a matter of familiar knowledge to us all to find, within the sphere of our acquaintance, persons endowed with considerable bodily vigour, who make use habitually of the cold bath. In all these cases, the remarks already made will apply. The practice, like that of carrying great weights, or of prolonged and varied muscular exercise, is not so much a cause as an evidence of strength. It may, indeed, like these latter, be made an instrument of physical education; but, like these also, it must be commenced with caution, and persevered in with moderation. General experience cannot, therefore, be adduced to encourage us to the use of cold bathing, as a ready means of strengthening the feeble, and of

substituting hardness for delicacy of frame. This opinion will be better understood, and its correctness admitted by our passing in review the obvious phenomena produced by cold, on the animal economy, from its first sensible effects to the extremity of its benumbing operation.

In hibernating animals, or those which become torpid during the winter season, we see a gradual diminution of vital energy in their less animal heat and slower respiration, in proportion as the coldness of the atmosphere increases. Though life remains, they are motionless and comparatively insensible. The temperature of their bodies is on a level with that of the air. Many of these animals are of the mammiferous or warm blooded class; but they differ from the majority of this class in their evolving habitually less caloric, and having less energetic respiration. It is on account of this comparative feebleness that they are so much more prone to feel the operation of cold, and lose their animal heat. A bat, for example, the heat of the body of which was at ninety-three degrees of Fahrenheit, the air of the atmosphere being sixty-one degrees, was put into an earthen jar in which the air was reduced by means of a freezing mixture to thirty-four degrees: its own heat fell to fifty-seven degrees*. In another experiment on a mountain rat this little animal, when exposed in the beginning of summer to great cold, soon became profoundly lethargic, and the temperature of its body fell from 95° to 41° Fahrenheit. On being subsequently exposed to the atmospherical heat at the time, it revived, and soon regained its former activity. This prompt parting with their caloric is one of the pecu-

* Edwards, Sur les Agens. Physiques.

liarities of warm blooded hibernating animals; but we are not to suppose that it is evinced by the large majority of the mammifera and birds. Guinea pigs and grown birds, placed in similar circumstances of a cold medium, were only reduced in heat between three and five degrees. But even this shows that the difference is only in degree, and not in kind, and depends not so much on specific organization as what may be called the accidental energy of respiration and calorification. The young of warm blooded animals, not of the hibernating kind, resemble these latter very closely, in the readiness with which they part with their heat; so that the temperature of their bodies is soon on a level with that of the surrounding atmosphere. Their breathing also is habitually less vigorous than in grown animals of the same species, and becomes, under exposure to cold, feebler than common. We are justified, therefore, from these premises, and numerous other facts of an analogous nature, to believe that *those animals, whether they be of a tender age or of the hibernating class, in which respiration and calorification are comparatively feeble, are the least able to resist cold; and that the direct tendency of this latter is to depress still more these two functions, so that less air is inhaled and consumed, and less heat evolved; and, at the same time, to produce a general torpor of the other functions, and especially of the nervous system.* With the energy of this system is intimately associated that of respiration and calorification: it evidently receives the first shock of cold, and on its powers of endurance and resistance will mainly depend the continued activity of the other two functions.

It would seem, however, as if the breathing was at times accelerated by cold; but we shall better ex-

press the fact if we say that the lungs in this case are subjected to two opposing influences. The immediate effect of cold is to diminish the activity of the circulation in the minute pulmonary blood vessels or capillaries, by inducing a collapse, and preventing the due passage of the blood from the arteries into the veins. Now, this interrupted circulation accumulates blood in the vessels, and acts as an additional stimulant or even irritant to them, and the nerves ramifying over them. The irritation is transmitted to the brain, which, in its turn, calls the respiratory muscles into hurried action to accelerate by more frequent expansions of the chest, and inhalations of air, the blood retarded in the capillaries. Similar phenomena take place here to what occurs when we are forced to inhale an impure air, which imperfectly stimulates the lungs: we pant and endeavour by increasing the amount of air in these organs to get a larger quantity of oxygen. In both cases, if the cold continues to be applied, and the impure air inhaled, the distinct and permanent effects of these agents, respectively, are evinced; viz. slower movements and torpor in the first, and asphyxia or suffocation in the latter.

When a person goes out into the cold air from a warm room, he promptly experiences a slight constriction of the surface, which soon becomes paler, and less sensitive than before. If the application of cold be continued, without this individual taking adequate exercise, his extremities will feel benumbed, his inclination to locomotion becomes less, his senses duller; respiration, at first somewhat hurried, is now slower, and he experiences a difficulty in arranging his thoughts, and a desire to sleep. This state, allowed to continue, ends at last in a complete torpor of all the

functions of the animal economy—death itself. We have here presented to us, clear evidences of diminished sensibility, speedily followed by impeded action of the capillaries, which are no longer able to give passage to, and transmit the blood through them; and hence the paleness of the skin. This shrinking or collapse of the minuter vessels, and retarded passage of the blood through others, occur on both the internal surfaces as well as on the skin; hence the colder air expired, and absence of thirst. To the conjoined interruption in the capillary circulation of the lungs, as well as of the skin, we may attribute the change of colour in the lips and other surfaces, which, from red, as they are naturally, now become of a bluish hue.

Not dissimilar from these are the effects of immersion of the body in cold water. Before describing them with minuteness, it will be well to remind the reader, that although some authors make sixty-five degrees the limit of the cold bath, yet, in reference to the impressions experienced on immersion of the body in this fluid—the shock, and the shiver, we are justifiable, indeed required to extend this limit to seventy-six degrees. The only difference between this and lower temperatures will consist in the intensity and duration of the impressions, but not in their nature and general results. A person leaving a hot medium, whether of air or water, would find a bath even ten degrees higher than this decidedly cold.

The application of cold water to the surface of the body, whether as in the common bath, or by shower, is promptly succeeded by a general chill and shivering, indicated in familiar language by the word shock. The skin is pale and shrunken, and not as erroneously supposed in a state of increased contraction or spasm.

The prominence of the papillæ, and roughness of the skin at this time, are not the result of an active process, but of the emptying and collapse of the numerous cutaneous vessels which leave the papillæ projecting, as it were, and cause, at the same time, a greater hardness of the skin. The firm fibrous tissue of the true skin and the horny character of the epidermis or scarf skin would naturally convey this sensation of hardness to the touch, when the elasticity and fulness of the capillary net work are lost by the removal, for the time, of the contained fluids. That there is really a shrinking of the vessels of the skin; diminished fulness, not only of them, but of the vessels in the cellular tissue beneath, we have good evidence in the familiar fact of a ring, which before the wearer's entering the bath just fitted the finger, or was perhaps rather tight, being found inconveniently large after coming out from it. Nor are the diminished paleness, fulness or plumpness of the outer surface evinced in those parts alone which touch the water. A cold bath, coming up only to the middle of the body, even a cold pediluvium or foot bath will remove the colour from the cheeks and give them, in persons of ready sensibility, a comparatively shrunken appearance.

Swayed by hypotheses, rather than observant of facts, medical writers have generally supposed that the blood, arrested in its free course through the vessels of the skin and parts immediately subjacent, was driven in increased amount into the internal organs; and hence fears expressed, and cautions given, not justified by the actual state of the case. A brief enumeration of the phenomena which occur will serve to dispel this illusion. We cannot indeed see what changes are

produced internally, but we are able to measure them with tolerable accuracy by particular symptoms, universally recognized as indicative of the real condition of the organs. First, then, as to the manner in which the lungs are affected. A warm, and, still more, hot vapour given out during respiration indicates an active, and in the latter case, highly excited state of the pulmonary circulation, and especially of the capillaries of the lining mucous membrane. Now, if a person, whose lungs are in this state of strong functional exercise, goes into a cold bath, we discover very speedily that the air which is expired is no longer hot or even near so warm as in common, nor so abundant in vapour. In other words, the air taken into the lungs is returned without undergoing changes to the same extent as before the cold immersion; and this is direct evidence of the diminished activity of the pulmonary circulation and of the secreting function of the respiratory mucous surface, which latter is in fact similarly, though not to the same extent, affected as the skin. Secondly, as to what transpires in the digestive canal; the changes in it are tolerably well represented by the corresponding alterations of appearance in the tongue and lining membrane of the mouth and fauces. It is well known, that when the stomach is highly excited, irritated or inflamed, the amount of blood circulating through, and contained in its vessels, is greater than before: there is a sensation of heat in the parts, and thirst; the mouth is dry and parched, and the tongue is in the same state, and in general, preternaturally red. Let a person thus suffering, use the cold bath, and what results? The mouth loses its dryness, the tongue much of its redness, if it do not become actually pale, thirst

is no longer felt, and the sensation of inward heat complained of, as well in the stomach as in the chest, has disappeared. Surely these two series of phenomena in the pulmonary and digestive apparatus, for changes similar to those above described in the state of the stomach, take place also in the course of the intestinal canal, afford no evidence of an unusual determination of blood to the organs of which they consist. On the contrary, we have an intimate conviction, from the feelings and symptoms, that there is now less blood, and a less active circulation, as well as diminished sensibility in these parts, such as we know there is in the skin. If, in the third place, we ask whether the paleness of the face, and the obviously diminished activity of the external vessels of the neck and head be replaced, in the cold bath, by an accumulation of blood in the brain, we cannot, on examination, but answer in the negative. The functions of the brain are vigorous in proportion to the amount of blood distributed to this organ; and it is only when the supply is excessive that the mental faculties, for a while preternaturally active, become perturbed and weakened; as in the state preceding delirium and apoplexy, and pending these maladies. But no symptoms analogous to these are discovered on immersion in the cold bath, and when the presumed determination of blood to the brain is supposed to exist. From the first application of the cold fluid, there follows impaired mental vivacity; the person feels dull, has his range of ideas limited, and perceptions blunted; he is torpid, but it is the torpor of gradually abated cerebral circulation, unaccompanied by those sensations of fulness, and singing in the ears, which would be caused by undue determination of blood to the part. Restoration of the

accustomed activity of the faculties and senses generally, in the case of the cold bath, is performed by means the very opposite of those which we would have recourse to where undue determination of blood existed. External warmth, and a mild, stimulating drink, are sufficient to relieve the torpor from cold; they would aggravate the state of a brain, where undue determination of blood had been the cause.

With the diminished activity of the brain and nervous system generally, there is, as an unavoidable consequence, less muscular power. The muscles deprived of the accustomed stimulus of the nerves, and also of the blood in their capillaries, which sympathise with those of the skin, are thrown into a state of inaction: their fibres approximate passively, owing to the distending fluids being withdrawn, and they are less bulky than usual. But we must not confound this approximation, any more than occasional or irregular spasm or cramp in portions of them, with increased contraction and increase of tonicity. The irregularity with which they may be supposed to be deprived of the stimulating influences of the blood in the capillaries, and of the nerves distributed to them, owing to their different degrees of sympathy with the skin, will sufficiently explain the feeling of partial contraction, or peculiar creeping movement occasionally experienced by a person in the cold bath. If this last be continued, the complete torpor of the nervous system, and of the capillaries throughout the body insures that of the muscles, which eventually become powerless and motionless, however inordinate and irregular may have been their contractions previously.

The effects of cold bathing on the circulation, as evinced by the contractions of the heart and the pul-

sations at the wrist, are somewhat dependent on the sensibility of the individual immersed. At times, where the impression on the sentient surface of the skin is prompt and powerful, and that by consensus or sympathy on the pulmonary mucous surface equally sudden and strong, the interruption to the capillary circulation in the lungs calls on the sensorium or cerebral centre for increased efforts of the respiratory muscles to heave and expand the chest; hence the breathing is panting and hurried, and the heart, struggling to clear itself of the blood thus hastily returned to it in a smaller circle, contracts with increased frequency. After a while, however, when the central portions of the nervous system, cerebro-spinal and ganglionic, participate with the sentient expansions in the enfeebling influence of cold, the heart beats slower and feebler, and the number of pulsations from being more frequent and hurried, now become slower and more uniform. We cannot for a moment confound this hurried respiration of some bathers on first entering a cold bath, with that which is produced by a real augmentation of blood in the lungs, and its rapid circulation through them, as after great exercise and the ingestion of nutritive and diffusible stimulants.

That the cold bath diminishes the frequency of the pulse, is a point positively affirmed by Marcard and Currie. The former; indeed, says that his experience is chiefly confined to what he calls cool baths, in which the water was of the temperature of 60° to 63° of Fahrenheit. Buchan (*Observations on Cold Bathing*) asserts, that in all whom he had any opportunities of making observations, it was at first accelerated; but he adds, that in the experiments instituted by Dr Currie, the pulsations of the person, who

was the subject of them, were found to decrease uniformly from ten to fifteen beats per minute, becoming at the same time firm, regular and small. Athill, though he expressly states that the pulse is greatly hurried during cold immersion, admits its subsequent retardation, and tells us that it is diminished in frequency from seventy-six to sixty beats in a minute, in water of 52° Fahrenheit.

But whatever doubts might have existed respecting the direct sedative and depressing effects of the cold bath, must be dispelled by a knowledge of its effects on the calorification or the formation of animal heat. When we discover that the evolution of caloric is less, and the ability to furnish it is diminished, we are satisfied at once of the feeble functions of the three systems, pulmonary, capillary, and nervous, since it is on the combined energy of these that the formation of animal heat in the economy mainly depends. Not only are we apprized of this diminished temperature by our sensations, but we also learn the fact by the application of the thermometer to a part of the body, under the tongue, to which the water has not access. Even for some time after leaving the bath, and when we feel a glow of pleasurable warmth, the temperature is still less than before immersion*; showing how profound was the sedative impression on the nervous system produced by the cold of the water.

The first or direct effects of the cold bath, whether we regard the phenomena evinced on the skin and membranes with which it directly sympathises, or those in the senses, and the brain and heart, are unequivocally sedative, and, under longer continu-

* Currie.

ance, enfeebling and stupifying. Some have referred much of the first effects of cold immersion or affusion to the shock or suddenness of impression on the nervous system. But we know that if a person immersed in a warm bath of 98° be gradually subjected to the operation of cold by lowering the temperature of the bath by the introduction of cold water, the customary effects of cold bathing will be experienced, although the individual in question was barely sensible of the change, and certainly experienced no shock.*

On coming out of the water, and while the bather is yet exposed to the air, the sensation of cold is increased, and is usually attended with shivering.—There is also a still farther reduction of animal heat†. These effects are most perceptible when immersion has been practised in the sea, or in a running stream, or other body of water, whereby a current of air passes over the naked skin, and causes augmented cold by evaporation.

After the skin is well dried, and the customary garments put on, the bather experiences what may be called the secondary or remoter effects of the bath. Unfortunately for hygiene and practical medicine, the sensations experienced by a particular class, viz. the sanguine and robust, after coming out of a cold bath, have been received as indications of its direct effects, and have laid the foundation for very erroneous hypothesis.

Thus, the glow over the surface of the body and feeling of general warmth—a restored equable circulation—vivacity of the senses and readiness to engage in muscular movements, are adduced as evidences of

* Giannini, Tom. I. p. 65.

† Currie and Buchan.

the stimulating and tonic effects of the cold bath. But the fallacy of such reasoning is soon exposed, when we inquire minutely into all the circumstances of the case. So far from there being a real increase of heat, the thermometer shows that the skin has not even at this time its customary temperature. The agreeable sensations then, derivable from this source, must proceed from the loss of the superfluous caloric and the moderated action of the parts which naturally evolve it. As to the glow experienced, it is merely relative to the cold medium in which the body had been immersed a few minutes before, and is a direct consequence of the law already referred to and explained in a preceding chapter*. But not only is there a forced repose, at least a diminished excitement of the organs of calorification, but also those of sensation and motion; and hence, on coming out of the bath, the accumulated nervous energy enables the individual to perform, for a time, the various functions with considerable promptitude and energy. The animal economy in such a case has not been stimulated; it has not by any means received a direct accession of strength; it has merely been allowed, in a measure, to rest and enjoy comparative exemption from the operation of agencies which, in their very nature, are more or less exhausting. It has in fact been placed in a state somewhat analogous to sleep, with this difference, that the cold has exerted its sedative influence more particularly on organic life or the nutritive viscera, while the quietude of sleep is more especially evinced in the organs of animal life or of relation.

The secondary state or series of effects of the cold

* Page 50, et seq.

bath has been designated by the term *reaction*; and when it occurs, it is generally regarded as evidence of the propriety of the bath. But in very many persons, immersion in cold water is not followed by these secondary effects or reaction. In them, we can only observe a persistence of the first and direct effects of the bath, viz. a sense of coldness, shivering, languor, dulness of the senses, disinclination to thought and motion, with pains in the head and joints, and feeble pulse. These phenomena are of most frequent occurrence in persons constitutionally weak and phlegmatic, who possess little energy of circulation, and are subject to cold extremities; in fine, to those who would seem to require to be roused by stimuli and strengthened by tonics. Now surely if the cold bath were either tonic or stimulant, it ought to be beneficial to this class of subjects; and yet, general experience predominating over false theory, shows us conclusively that it makes them feeble. Nor need this fact excite our surprise when the true operation of the cold bath is appreciated as it ought to be, and in the way in which I have endeavoured to display it in the preceding pages. What is the effect of sudden and great cold on a person whose organs possess but a limited degree of energy, and in whom the functions of sensibility, calorification, and respiration are especially feeble? Not only is the evolution of caloric suspended, but the organs by which it is formed are rendered, in a measure, torpid, and unable, even when the depressing power of cold is withdrawn, to secrete or generate it as before: similar evils are inflicted, through the skin, on the respiratory and digestive surfaces, which are unable to change with requisite promptitude the air and food, respectively, which may be applied

to them: the nervous system at large is enfeebled, and hence also disinclination to motion, for the muscles are very closely allied to the nerves, and whatever exhausts or enfeebles the latter, prevents the free and vigorous movements of the former. This sensation of cold may last for hours and even days, as in the instance of the young man already mentioned*.

It would be very unphilosophical if we were to include among the effects of cold on hybernating animals, the renewal of their sensibility and locomotive powers in the spring, after the state of torpor in which they had been thrown during the winter. They are roused by a vernal sun or the mild air of a vernal day, and undergo a *reaction*; but surely this is not the effect of the cold, except in as far as any sequence or any phenomenon occurring after another can be called an effect of this latter. A person coming out of a cold bath after a temporary benumbing in it, experiences reaction when he passes into a warm air, or even when returning into the air which he had left; but this restoration, more or less complete, of the exercise of his functions is no evidence of increased power, nor a direct effect of the cold. The two series of phenomena, first, those of direct sedation of a person in the bath, and secondly, of restored function or reaction on coming out of it, are as distinct in fact, though not separated by the same lapse of time, as the winter torpor and spring renovation of the hybernating animals. These latter are thrown into their winter sleep with readiness proportionate to their existing feebleness from fasting and other causes; some of them never react or recover from

* Page 63.

their torpor. So it is with persons who use the cold bath: if feeble, from poor regimen, protracted disease, loss of sleep, sensual exercises, they soon feel its sedative and benumbing influence, and with difficulty recover from this state, that is, they are slow to undergo reaction and to have their functions restored.

General experience confirms the correctness of this view of the effects of the cold bath. We find that the sanguine and robust, in whom the animal heat is habitually great and rather in excess, are they who can use it with the most comfort and advantage. If had recourse to in infancy and early life, it furnishes a very good test of the innate vigor of the individual; the robust child will probably bear well the application; he will often thrive *while* using it, though it may not be *on account* of using it. But the thin, delicate, and feeble infant whose temperature is already too low, and whose functions react imperfectly under any depressing agency, will be permanently and prejudicially affected by cold immersion. The example of Spartan and Welsh mothers and nurses, together with occasional speculations of theorists, should weigh little in these cases against our knowledge and experience directly obtained from physiology and daily observation. The actually less animal heat of children, and the greater readiness with which they part with it, ought, at once, to satisfy us of the impropriety of still further reducing it, and of enfeebling by cold the sources of its supply. The highly pernicious operation of this agent on the young of all animals, by laying the foundation for slow lingering disease and glandular obstructions, where it does not directly prostrate the powers of life, has of late years

been very fully set forth by many writers*. It is more particularly prejudicial in those cases of feeble circulation arising from organic deficiencies in the structure of the heart or lungs, in which the cold bath has been often employed as a tonic. It is difficult to conceive how there ever could arise such a singular perversion of language and contradiction in reasoning, as to call a tonic that agent which directly lessens all the powers of life, which checks so promptly various discharges, the avowed results of excitement, and prior to the administration of which, the first condition inquired into is whether the individual have strength enough for reaction.

The directions laid down by Galen, which we may regard, also, as indicative of the practice among the Romans, respecting the use of the cold bath, are such as have been proved in all succeeding times to be the most rational and beneficial. He says, it is proper for persons in perfect health, and for fleshy ones, for the temperate and those who use due exercise; the chief period is summer, and one must be gradually accustomed to it. The body is to be prepared by a moderate gymnasterium or exercise of the gymnasium, and by friction with a coarse cloth, and sometimes by the prior use of the warm bath. After coming out of the cold water, the bather is to be rubbed well with oil, and that with some force, until the skin is warmed. A hearty meal and drink according to custom are afterwards allowed. The duration of the bath, on the same authority, has been too long, when after coming out of it the body is very pale, and is not

* Drs W. F. and M. Edwards; Drs Villerme, Flourens, Fontanelle, Trevisano.

soon heated again by friction, and does not recover its natural colour and heat thereby*. On the contrary, Galen believed cold bathing to be injurious to thin habits, old men and children, very cold constitutions, and those who live intemperately and use no exercise; and it is, he adds, dangerous after venery, lassitude, crudities, vomiting, gripes, looseness, watching, and to those who are not accustomed to it. Without pledging ourselves to the entire accuracy of every point indicated by this celebrated writer, we are safe in abiding by the general inferences directly deducible from his advice, inferences strictly in accordance with the views which I have thought it exceedingly important to induce my readers to adopt. As still farther corroborative of the sedative nature of cold bathing, we need but advert to the practice already mentioned, as common among the Romans in ancient times, and the Russians at the present day, of having recourse to cold affusion after the use of the hot bath, and with the avowed intention and effect of moderating by the former the excessive excitement induced by the latter. Now I would ask is it conformable with any principle in physiology and medicine, to apply a stimulant or tonic, as cold has by some been strangely called, to the same surface, and to the same extent, as that through which high excitement, amounting to fever, with hot burning skin and throbbing temples, had been caused. Hot bathing has caused excessive excitement and fever; and if it is to be succeeded by cold bathing, surely the recourse is had with very different views from those which induce us to resort to a stimulant or a tonic. It was not under

* Floyer, *Psychrologia*, Part I.

such an impression of its effects that “the old *athletæ* bathed in cold water oft; to prevent any unchaste desires.”

The general principles having been advanced by which we ought to be regulated in the use and recommendation of the cold bath, I shall now proceed to detail the circumstances under which it is adapted to the great variety of infirmities and diseases of the animal economy. Here it may be well to state, that for hygienic purposes, that is, when it is to be used by individuals themselves for obviating unpleasant sensations and infirmities, the range of the cold bath is sufficiently extensive, from 50° to 70° of Fahrenheit. The different methods by which the water is applied to the body may, also, be as well mentioned here as in any other place. 1. The bath proper, or by *immersion*, answers well enough for those whose vigorous health, or excited state of body and superabundant heat allow of frequent and habitual recourse to it. 2. *Affusion*, or pouring the fluid over the body, is a briefer and less trying application in regard to the abstraction of animal heat, although the unavoidable inequality with which it touches the surface gives a greater shock and tremor than the bath proper. The shower bath comes under this head. 3. *Ablution* or *sponging* affects the body less harshly than either of the other two methods, since the cold fluid is applied so very temporarily, as to be soon vaporized by the common heat of the skin. But if the operation be frequently repeated, a considerable reduction of temperature by continued evaporation may be produced, and the skin be rendered comparatively torpid. A great advantage attending ablution is, that it admits of local employment, so that we need only to wet the

particular portion of the skin on and through the sympathies of which with other parts, we hope more immediately to operate. The application to the skin of wet cloths or lotions acts in the same way as sponging. 4. *Douching* or spout bath is the local use of water by means of a canal or tube, and is capable of acting very powerfully on the part to which it is applied.

Among the disorders for which cold bathing has been recommended, those vaguely called nervous have been most frequently enumerated. They are, however, of two very distinct classes, the one consisting mainly in morbid sensibility of the nervous system, the other in continued irritation of this system transmitted from other parts, such as the stomach and liver. In the former, where there is simple or morbid susceptibility of the different senses to the slightest deviation from the usual amount and order of stimulation, as of the skin to atmospherical changes, &c. sponging the surface with cold water and subsequent friction are often beneficial. On occasions, if the circulation be tolerably active and the skin not habitually cold, a momentary immersion may be admissible. By this means the acuteness of sensation is blunted by the sedative action of cold on the nerves. The skin also acquires more density, if not actual thickness, and on this account transmits less readily the impressions of external cold and heat. Coinciding with the use of the cold bath in these ought to be the practice of regular and active muscular exercise, which is one of the most efficient means of calling off, by directly exhausting, exuberant nervous power.

In the other kind of nervousness, arising from indigestion, chronic disease of the liver, protracted intel-

lectual efforts and late hours, and accompanied by headach, palpitations, &c. the nervous system is enfeebled by the irritation to which it has been long subjected, and can illy bear the sedation of cold. Hence it is that the hypochondriac can so rarely tolerate a cold bath. Sometimes the active exercise of swimming may counteract the depression produced by the water itself, and he will derive more benefit from bathing in a river or on the sea shore than immersion at home. Generally speaking, however, great reserve is necessary in the use of cold bathing in subjects of this class. I have seen even the local immersion or washing of the head, so common a practice at boarding schools, greatly aggravate the dull pain and unpleasant heaviness of this part. Bathing the feet in cold water is also, generally, prejudicial to the dyspeptic and hypochondriac. Although it is no uncommon thing to see reaction indicated by restored warmth and sensation, even heat of the skin in general, and extremities in particular, in these persons, yet they experience, after bathing, pains in the head and joints, and disinclination and inability to exert either body or mind. There is, also, usually increased disturbance of the suffering organ, stomach or liver, which participates in the reactive state of the skin.

To another class of persons, becoming, with the advancement of civilization, every year more numerous, an occasional use of the cold bath by immersion, or daily sponging with cold water, is of great benefit. These suffer from a sedentary life, devotion to the desk in business or study, and complain of a troublesome heat and dryness of the hands, and sometimes of

the feet, with accelerated pulse and thirst: their appetite is not good, nor their sleep sound or refreshing. Though their systems be actually weaker than usual, yet is there morbid activity of the skin, owing to the vessels of this part not relieving themselves by free and regular perspiration. Cold bathing, by moderating cutaneous excitement, removes the unpleasant feeling of heat and dryness, and, by sympathy, produces nearly correspondent effects on the stomach. The use of the flesh brush and exercise in the open air are, it may readily be supposed, powerful auxiliaries to the measure just recommended. If the individual be intemperate in drinking, or deprive himself of his natural repose by night, we cannot look for the same good effects as in the case of the temperate, sedentary man, from cold bathing.

There are many persons who, though enjoying what is often called full health, are liable to colds, rheumatic pains and stitches from any slight exposure to cold or moist air. Their vascular and nervous systems are both tolerably excitable, and they are readily thrown into perspiration from even moderate exercise or warm apartments. In them, it is desirable so far to regulate the function of the skin as to moderate its excitement, and prevent the consequent debility which follows this state. Cold bathing accomplishes this purpose, and keeps the skin of a less uniform excitement, renders it less liable to sweat so freely from exposure to external warmth or by active exercise, and of course prevents the subsequent languor and susceptibility to morbid and enfeebling agencies. It would be a great mistake in such a case to talk of the tonic action of cold water. Its beneficial operation is evinced here at a time when no stimulus or tonic is admis-

sible, and in habits sanguine and plethoric, on whom nearly similar effects with those from cold bathing would be produced by a moderate bleeding, reduction of the usual quantity of food, and diluent drinks.

The *diseases* in which cold water has been applied externally, under professional directions, are numerous, but, in respect to their essential character, not very diversified. They are all marked by symptoms of augmented and morbidly excited action of the sanguiferous system, or at least of the capillary parts of the membranous tissues, and are accompanied with excessive evolution of caloric, as we see in *fevers*, so called by systematic writers, *hemorrhages*, and *inflammations*, internal as well as external. The most enlightened, and, it is to be hoped one may add, numerous portion of the medical profession, now recognize in the regular application of cold an important auxiliary to, and on occasions a substitute for blood-letting. I shall not enter here into any retrospective view of the causes, whether from false theories among physicians, or ignorant prejudices, though still the result of false theory among the people at large, which so long retarded the general use of cold baths in fevers. One might suppose that this remedy would have been immediately adopted, as part of the reform operated by Sydenham; and that the cooling regimen was but very imperfectly adhered to, when, with the admission of cold and fresh air into the apartments of the febrile patient, was not coupled the administration externally and internally of cold fresh water to his body. The practice of bathing in fevers, though adopted occasionally at different times and in various countries, was never fairly introduced into curative medicine in a systematized shape, until the publication

of the work* of the late Dr Currie of Liverpool in 1797. This gentleman refers to some successful trials of cold ablution in fever made by Dr Wright as far back as 1777, and also by Dr C.'s colleague, Dr Brandreth. Dr Jackson of the British Army published his success with the remedy in 1791. The first time of Dr Currie's employing the affusion of cold water was on the occasion of a fever in the Liverpool Infirmary, which broke out on the 9th of December 1787.

The lover of retrospective lore will soon discover that the practice of cold bathing in fevers was adverted to by Hippocrates, and recommended and put in practice by Galen. Cold affusion was advised by Ætius for those who are burnt by the extreme heat of the sun; a state closely resembling the paroxysm of violent fever. According to Sir John Chardin, the celebrated traveller, the Persian physicians, devoted followers of the Galenical school, had frequent recourse to bathing in febrile diseases. His own case is a remarkable example of their practice in this particular. He had with him a French surgeon who gave him every assistance in his power during the violent remittent fever with which Sir John was attacked; but on arriving at Laar they concluded to send for the governor's physician. This latter on his arrival stated the nature of the disease (the fever of Bender), and, contrary to the gloomy prognostics of Sir John and his professional friend, promised a speedy cure. Chardin called out, "I am dying of heat." "I know it," said he, "but you shall soon be cooled."

* "Medical Reports of 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."

“As in the extreme heat of my fever,” says Charadin, “I thought nothing could be so delicious as drinking snow-water, I sent to beg a little snow of the governor, who sent me some about eleven o’clock; and as I then had the most raging thirst, I drank with more pleasure and avidity than I had ever done in my life. My apothecary was always near me. It was he who administered the liquid to me. He filled a large vase with barley-water and willow-water, put a large lump of snow into it, and, when it was half melted, gave me the vessel, and desired me to drink my fill. The pleasure I had in drinking was the greater, because the liquid was very agreeable to the taste, and I took it by the physician’s desire. I was lying on the ground floor of the house, in a cool room, my bed stretched on the ground. Every hour the floor was watered, so that it might be said to have been quite covered with water. But nothing could allay the heat of my malignant fever, which seemed to be irritated rather than abated by so many cooling remedies. My apothecary then ordered my bed to be taken up, saying it heated me; and he spread a thin mat in its place, upon which he made me lie down in my shirt, without any other covering, and then made two men come and fan me. But this was of no avail, the heat continued as oppressive as ever. The apothecary, who paid me the most constant attention, then procured two buckets of cold water, and having placed me on a chair, on which I was supported by two men, poured the water over my body by little and little, from the haunches downwards, and then taking a large bottle of rose-water, bathed, in the same manner, my head, face, arms, and breast. I blessed, in my heart, the Persian practice of medicine, which

treated sick persons so voluptuously! But our French surgeon, who was always by me, could not contain his indignation. 'The man is killing you, sir,' said he to me in a compassionate tone. 'What! *bathe* you with cold water in the heat of a malignant fever, with a pint of emulsion, two pints of decoction, and a pound of confection in your belly, with I do not know how many draughts of snow-water. Depend upon it,' added he, 'that instead of being very soon without fever, as he has promised you, your death will be the end of the business.'—'I do not know what will happen,' answered I, 'but at any rate I do not feel as if I were about to die, as you suppose.' Indeed at that moment I felt the heat within me diminish, and my senses return; upon which my apothecary, having felt my pulse, said, 'your fever is abating.' It went off from that time so quickly, that by one o'clock in the afternoon I was quite free from it, even in the opinion of the French surgeon. He was quite astonished, and I was transported with joy. After having offered up my devotions to God, as to the first cause of my recovery, I said to the apothecary, that to complete my happiness I must see my physician. He will return, said he, by the time the medicines have operated. I took them, as I have said, at nine in the morning, and I had only since that time experienced a kind of heaviness, which swelled me up very much without griping me, so that I imagined they would have no effect upon me, and that their efficacy was exhausted in my continued sweating. But in a quarter of an hour afterwards a looseness seized me, and lasted two whole hours, without any pain or uneasiness. In the evening the physician came to see me, and I received him as a prophet, or as Esculapius himself.

He had learned from the apothecary how I had spent the day, and he ordered me a mess of rice boiled in water, with cinnamon and the bark of dried pomegranate pounded together. I had taken no nourishment whatever for five days.

“ ‘ On the 28th, when I awoke, I was a little feverish, on which account the physician, when he came to see me, ordered me an emulsion of the *cold seeds* (melon, cucumber, gourds, and pompions), and a dose of the confection, as the day before, recommending that I should eat raw cucumbers. These remedies were given to me at nine o'clock in the morning, and I did nothing all day but drink, most deliciously, willow-water, and barley water, cooled with snow, eating raw cucumbers, water-melons and pears. Verjuice, in considerable quantity, was put into the mess which I took at noon and in the evening, to give it an agreeable taste, and it most wonderfully lessened my thirst.

“ ‘ The next morning, the physician having found me still rather feverish, ordered me medicines similar to those I had taken on the 27th. These purged me during the whole day with so much violence, that I had nearly sunk several times under the effects. The night was still worse than the day, as I passed it in pain, with a violent increase of fever. My physician found me in that state, and, as usual, filled me with consolation; for, after having felt my pulse attentively, he told me that he was going to give me some draughts that would carry off what fever remained, and deliver me from it entirely. This certainly took place, but I do not know how he accomplished it. I only know that about nine o'clock in the morning I

took two pints of emulsion, with a large dose of confection, as on the preceding days, and half an hour afterwards a julep; after which I fell asleep, and when I awoke in the afternoon, my head was clear, I was without fever, perfectly tranquil, and, as I thought, entirely restored to health.

“ ‘I was so much transported with joy, that I could not find utterance to my feelings, relying on the word of my physician, whom I thought an oracle, that the fever would return no more.

“ ‘On the morning of the 31st he confirmed his opinion, and ordered me to live ten days together on chicken and rice, without any thing else; at the end of which time he said I might live as usual. I asked him how many days it would be before I could pursue my journey? He told me that two more days of repose would be sufficient, and that I might then set out on horse-back. He once more ordered me a great dose of emulsions and cordials, as before.

“ ‘On the first of June he came to see me for the last time, saying that I was not any longer in need of his visits; that he had ordered the apothecary to bring me the materials for ten emulsions, and to teach my servant how to prepare them; also a box of salts, and thirty-five drachms of cooling confection, of which I was to take one drachm daily, when I awoke, and to drink after it a glass of water. He said it was to warm and fortify my stomach, which so many emulsions and cooling medicines had considerably weakened.’

“ ‘On the third of June, Sir John Chardin proceeded on his journey, and experienced no relapse; and on the 17th he reached Chiraz, in a convalescent state

and still weak, but otherwise so well that he left off his medicines*.”

Dr Currie, from whom I have taken the preceding account, very properly supposes that the fever under which Sir John Chardin suffered, was the bilious remittent fever. The cold, it is to be observed, was applied in this case during the height of the paroxysm when the heat and thirst were the most urgent. “The laxative medicines were no doubt of service in carrying off the morbid contents of the alimentary canal; but they seem to have been carried to excess on the 29th May, and to this circumstance the return of fever may be imputed. The bitter medicine was no doubt a decoction or infusion of some vegetable, in its qualities resembling the cinchona; and the cooling confection was certainly the celebrated mithridate, a combination of opium and aromatics, well known over the eastern as well as the western world.”

In Abyssinia, according to Bruce, the practice of using cold water, externally as well as by drink, is very general in the violent fevers of that country. Remembering, however, the high heat of that region throughout the year, we must be aware that the temperature of the water is proportionably elevated, probably equal to 76° or even 80° of Fahrenheit. Savary tells us that the Egyptians pursue nearly a similar practice in their fevers.

More was done by Sir John Floyer, than by any other physician before his time, to make the cold bath popular in England†. His eulogies on the practice

* *Voyages de M. le Chevalier Chardin*, Tom. IX, p. 293.

† *Psyrologia, or the History of Cold Bathing, both Ancient and Modern*. In two parts. London, 1722.

occasionally border on extravagance; but it must be acknowledged that his work contains numerous instances of the efficacy of his favourite remedy. To some of these I may perhaps have occasion hereafter to refer. The experience of Floyer of the benefits of cold bathing was chiefly in various chronic maladies rather than fevers. The practice of De Hahn in the epidemic fever at Breslau, in 1737, is more to the present purpose. It consisted of the external use of cold water. De Hahn himself recovered by this means, which was eminently successful when contrasted with that of the other physicians who would not make use of the remedy. Anterior to this, however, the Neapolitan physician Cirillo (1729), a strenuous advocate of the watery regimen carried to its full extent in fevers, had directed the skin of the sick to be rubbed with snow. The work of Von der Heyde *on the surprising effects of cold water* internally and externally, is also occasionally alluded to by writers on the subject. But one of the most interesting accounts of the use of cold ablution, in modern times, is that given by Samoilowitz in his *History of the Plague at Moscow* (1771). When we say cold ablution, we express not so much the precise or technical language for the practice, as that which corresponds most nearly with his method, which consisted in frictions of the skin with pounded ice, and in the application of cloths dipped in very cold water, or inclosing the ice itself*.

We shall give at once some of the details of the practice of Samoilowitz as illustrative of the true value of the remedial action of cold in febrile diseases. The

* Giannini, delle Febbri. Napoli, 1817.

first case which he cites is that of a young girl sixteen years of age, who, on the second day of her disease (the plague), exhibited mortal symptoms—universal tremors, and fainting on any attempt to sit up, continued stupor, involuntary renal and intestinal discharges, and excessive menstruation; skin dry, acute inguinal pains, but no bubo. In this extremity the author directed frictions of ice at ten o'clock in the morning; the face and neck were simply bathed with cloths dipped in ice water. Scarcely was this process, which lasted about an hour, completed, when the whole surface of the body became of a lively red colour, and vapour rose from it like when one comes out of a bath. Some coldness and trembling were afterwards experienced, and the patient was well dried and put to bed. The frictions with ice were, on the reappearance of many of the symptoms, repeated at two o'clock in the afternoon and at ten in the evening. On the next or third day of the disease, things were nearly stationary; the ice frictions were repeated four times, and cold acidulated rice water given internally. On the fourth day the symptoms were somewhat abated; a bubo began to rise: the frictions were used four times. The drink was cold water acidulated with a little elixir of vitriol. There was henceforward a gradual amelioration of the symptoms until the eighth day, when the skin became dry, the pulse harder, fuller and more frequent, probably owing to the liberal use of bark on the preceding day. The frictions had still been employed, but less frequently. Now cloths dipped in ice water were freely rubbed over the surface. The following day found her once more convalescent. In place of the bark, a glass of wine was allowed her at dinner. On the sixteenth

day from her first seizure, she had entirely recovered. Before recourse was had to the cold applications, the chief thing prescribed on the first day was an emetic, which was repeated in the evening. The result of its operation was not very flattering, and we are left fairly to infer, that the active and curative means in this case, from the morning of the second day of the disease, were the frictions with ice and cold acidulated drinks.

The next case detailed by Samoilowitz was of a young man seventeen years of age, on whom, in addition to many symptoms of a very grave character, there appeared a petechial eruption. The frictions of ice were practised on him until his skin became red and he began to tremble with cold. There would seem to be some contradiction in this part of the narrative, did we not bear in mind that the redness was here the result of the mechanical action of rubbing, while the chilling influence of the ice was, notwithstanding, finally displayed. This patient entirely recovered on the seventh day. The only means of cure additional to the ice frictions, mentioned by the author, was an emetic administered on the first day. Carbuncles appeared on this person, which on the fourth day began to slough.

Samoilowitz seems to have foreseen the probability of his cold treatment being usefully applied to other diseases having any analogy to the plague; and his anticipations have been fully verified. In forms of fever in which the evolution of heat is excessive, the skin acrid and hot to the touch, either partially or entirely, the brain affected with delirium or stupor, thirst urgent, tongue either dry and furred, or red and shining, or darkly incrustated, cold immersion or affusion,

and, still more frequently, cold ablution or sponging have been found signally efficacious. Nor are we at this time restrained by the fears entertained by Currie of the prejudicial effects of the cold bath in fevers with local inflammation. Without entering into minute pathological investigations, or giving my own creed, in detail, of the origin of fevers, it is sufficient to say, that in our autumnal remittents, whether in the first, or what is sometimes called inflammatory stage, and in the second, or typhoid, or congestive, there are unequivocal symptoms, at times of gastritis, at others of gastro-enteritis, and again of arachnitis and cerebritis—and sometimes all these conjoined.—Now in these diseases, we can have no hesitation, when the skin is of an exalted temperature, not only to sponge the surface freely with cold water, or to immerse the whole body in the same, but also to apply pounded ice, or cloths dipped in ice water, to the region more particularly excited and phlogosed, and in which the heat is greatest, as to the head and to the epigastric region. Not unfrequently the temperature of the surface is so unequal that neither cold immersion nor affusion would seem to be indicated, and yet on occasions both have been employed with success. Here, however, the safest plan, and that recognized by experience as the most efficacious, consists in the local application of cold. It may happen that while the carotids and temporals throb with painful force, and the face is flushed and head excessively hot, the feet are at the same time cold.—In such a case, cloths containing ice, or dipped in ice water, should be kept to the head; the feet being moderately stimulated either by warm pediluvia, frictions, or sinapisms. Similar applications are required in certain cases of gastric

fever, or at least in fevers in which gastric symptoms predominate; such as great heat in the stomach, and of the skin of the epigastric region, tenderness and often pain on pressure, dry parched tongue and fauces. When the morbid heat is felt all over the abdomen, and the other symptoms also present, an excellent adjunct to cold ablution is cold enemeta, or what the French and Italians would call internal *douche*. If our prescriptions of cold bathing in fevers be not more frequently followed by decidedly beneficial results, the cause must be found in an oversight of the consensus at this time between the skin and gastric intestinal surface, and of the fact that the irritation, indicated by excessive heat, dryness and suspended secretion of the external surface, has for counterpart nearly the same state of things on the internal. Symptoms then, not less than the cravings of the patient, seem to call for the administration of simple cool or cold fluids for drink, as imperiously as for bathing. The practice of Cirillo at Naples in what was then, and is too often now, vaguely called malignant fevers, was to give the patient no other drink than water cooled by the addition of snow: a pint or two were directed every two hours for several days—seven, eight and ten. During this time, no kind of aliment was taken, and when finally allowed, it was of the lightest kind; such as panada and the like. Hiccup supervening was only met by the free ingestion of the snow water, and was found to be relieved by such a drink. So soon as sweat supervened, this beverage was omitted, or given with great reserve. The same precaution in the use of the cold bath is of paramount importance. We may not feel inclined to carry the watery regimen to the extent practised by Cerillo and the Span-

ish and Neapolitan schools; but it must, at the same time, be admitted, that physicians are singularly inconsistent in their practice, when they direct cold water to be applied to the skin, with the view of moderating excessive action of its capillaries and morbid evolution of caloric, and yet administer stimuli in the shape of cordial draughts, and juleps, and also tonics, to the gastric mucous surface, which is at this time equally a sufferer with the skin from inordinate capillary excitement. The obvious symptoms furnished by each surface, the cutaneous and digestive mucous, the admitted consensus or sympathy between them, the general sameness of effect, both of heat and warmth applied by means of water, ought all to guard us against the pernicious error of exciting the stomach, which is in a state of not less excessive irritation than the skin, to which however we deem it right to apply sedative and cooling means. The disappearance of internal heat and thirst, and a less dry and parched tongue after cold immersion or affusion, and, *e converso*, after drinking cold water, the softness and even sensible perspiration on a skin hitherto of a dry acrid heat, are evidences both of the sameness of morbid condition of these two parts in febrile diseases, and guides for a correct method of curing them. A still farther confirmation of this view is found in the salutary effects of injections of cold water into the lower portion of the intestinal canal. These often, of themselves, allay thirst and remove the morbid heat of the skin.

I should feel more diffidence in pressing this subject on the attention of the reader, if my opinion of the watery regimen, by which I understand the regulated use of water, both internally and externally, in the treatment of disease, were merely founded on the

experience of others, or induction from the most plausible physiological premises. But I have myself so fully tested its value by ample personal observation and experience, as to place the question, in my own mind, beyond doubt, and to make me entertain a thorough conviction that it only requires suspension on the part of others, of preconceived notions, and a candid trial, to have them enlisted on my side.

Guided by a sound knowledge of the really immediate effects of cold applied to the human body, we can have little difficulty in pointing out; even *à priori*, the stages of fever, and the forms of disease in general, in which it will be most advantageous. Thus, in the *hot stage of Intermittent Fever*, we have at once an intimate conviction of the efficacy of this remedy. The skin is hot, thirst great, respiration hurried and laborious, pulse frequent and somewhat full, at times resisting; the senses are intolerant of their customary stimuli, and the mind is highly excited, even occasionally to delirium. The patient cannot bear the slightest covering over him; he pants for a little cool air, and seizes with avidity on cold drinks; he abhors at this time all kind of stimuli. Physicians are very generally agreed that stimuli ought to be withheld; many, and, from my own experience in some hundred cases of this disease, I should say wisely direct bleeding. But if we desire to give the speediest relief in the shortest period and simplest manner, and at the same time prepare the patient for other appropriate remedial means, we shall not hesitate to have recourse to the cold bath, either by immersion or affusion. It is impossible for any person, who has not actually experienced the efficacy of this remedy on himself, to realize the delightful transition from suffering to ease, from the raging

heat and unquenchable thirst of fever to the coolness and calmness of sensations, which follow the use of the cold bath in the hot stage of intermittent fever. It cools, soothes, and quiets by effectually reducing the excessive capillary excitement in all the membranes and sensitive expansions. If the cold bath were in the slightest degree stimulant, would we not have recourse to it during, or immediately on the accession of, the cold stage? But no, we employ it in the hot, when we employ blood-letting, diluents, and saline and cooling remedies, and surely with any other view than to its stimulant operation. Of the employment of cold bathing during the interval between the paroxysms, I cannot better express my sentiments, than in repeating what I have said on a former occasion in my "Remarks on the Pathology and Treatment of Intermittent Fever*."

"Occasionally we hear of practitioners relying exclusively on the use of the cold bath for the cure of intermittents. A knowledge of the directly sedative effects of cold, and observation of its power of reducing febrile action to the normal healthy standard, as in the hot stage of intermittent fever, will make us slow to direct it during the interval, when there is often little or no superfluous excitement, and the predisposition to chill is manifestly great. It is hardly wise to imitate a paroxysm of fever by subjecting an individual, whose nervous system is rather enfeebled than excited, to a cold bath. He is necessarily chilled, has some rigors; and, in the most favourable state, a subsequent glow and reaction. Nor does the disturbance end here: pains in the limbs and head, and languor are

* North American Medical and Surgical Journal, Vol. VIII, p. 264—5.

often complained of by those who use the cold bath, when the system is not above the natural level of excitement. From these premises, not a little strengthened by experience, I should feel inclined to regard habitual cold bathing in the interval as a hazardous remedy, and rendered often mischievous by the prevalent errors regarding its *modus operandi*. Very different are its effects when used in the hot stage of intermittent, or in the more permanent capillary excitement of gastro-cerebral fever, usually denominated typhus. The morbid excitement of the sanguineo-nervous structures, entering into the composition of the membranes, and chiefly instrumental in the secretions, including that of caloric, is abated and often entirely removed; the patient is rendered tranquil, and enjoys a pleasant slumber, unbroken by the former irritations of heat and thirst. Just in proportion as the state of the patient during the interval approaches to that exhibited in the hot stage, will cold bathing be useful, but not otherwise. Hence, if there be a steady dry heat of the skin, frequent pulse, with thirst and little or no appetite, we shall derive good effects from cold affusion in the period between the paroxysms. This remedy is not, therefore, as often taught, akin to bark; the two stand opposed to each other in their effects, and their use is only properly called for under different and opposite circumstances; the one to allay morbid irritation and inflammation; the other to exalt and strengthen parts already feeble."

The principles which ought to guide us in the use of the cold bath in febrile diseases being now understood by the reader, it will be sufficient for me to mention briefly the varieties of fever in which the remedy has been successfully resorted to. In *Scarlet Fever*,

cold bathing has displayed the best effects. Here *à priori* we should anticipate much from it. The skin of an acrid heat, high membranous irritation involving the reticulated capillary and nervous tissues, without corresponding excitement of the general blood-vessel system, is a state of things calling for the sedation of cold, without allowing of extensive sanguineous depletion. The disease is almost purely membranous, and restricted to the muco-cutaneous surfaces. On these the cold bath operates with promptness and decisive effects, since the impression produced on the skin is felt almost at the same moment throughout the digestive mucous surface. The experience of Currie has been amply confirmed by succeeding practitioners, and it will be sufficient for my present purpose to give his account of the course which he pursued in the cases of two of his own children attacked with scarlet fever.

“ In the years 1798, 1799, and 1800, several cases of scarlatina occurred, in which I employed cold and tepid affusion, according to the degree of heat and the stages of the disease, with very general success. I was fully prepared, therefore, for the treatment of the wide-spreading and fatal epidemic which broke out the latter end of the summer of 1801. My family was at that time in the country, where it was seldom in my power to visit them. The scarlet fever had appeared among the children in their vicinity, and carried off several. My two youngest children who had not had the disease, both boys, one five, and the other three years of age, had been in company with some of these children at play, and had been exposed to the contagion. I gave directions that they should be watched narrowly, and that I should have intima-

tion of the first appearance of complaint. On the morning of the fifteenth of August, a message was sent me, that the eldest of the two had been restless and uneasy in the night, with feverish chills, and pain in his head and back. I saw him in seven hours from the first of these chills: he was then becoming hot, and had vomited up his tea: his face and neck were beginning to flush, and it was evident that he was attacked by scarlatina. His younger brother had constantly slept in the same bed with him; though then walking about, he was evidently spiritless and languid, and there was little doubt that he also had caught the disease. In a little while the eldest boy became very hot, and the youngest sick and restless. He followed his brother, step by step, at the distance of about seven hours. The heat of the eldest soon raised the mercury of the thermometer to 106°, 107°, and 108°, and in both the symptoms prognosticated a violent disease. I had lost a girl of four years of age in scarlatina a few years before, though her first symptoms were far less violent; she perished in consequence of the ulcerations extending to the epiglottis and larynx, and producing the symptoms of genuine croup. I shut myself up with these boys; and with plenty of pump water and a pocket thermometer, prepared, not without anxiety, to combat this formidable disease. It would be tedious and useless to go into details. As soon as the sensation of heat was steady in my eldest boy, I stripped him naked, and poured four gallons of water over him, of the temperature of 64°. The usual good effects immediately appeared, but at the end of two hours he was as hot as ever—the remedy was again applied, and repeated as the return of heat indicated. By the

time the eldest was ready for his third affusion the youngest was ready for his first. The heat rose in the eldest to 109° , in the youngest to 108° , and the pulse in each was upwards of 150° . In thirty-two hours the first had the affusion fourteen times; eight times cold, twice cool, and four times tepid. Twelve affusions sufficed in the case of the youngest, of which seven were cold. The fever was in both completely subdued. On the morning of the third day they were both evidently safe; and on the morning of the fourth, though the pulse was still a little more frequent than natural, they were both convalescent. In this state they inclined to sleep and rest. The scarf-skin peeled off them both, and each had a slight degree of swelling in the hands, but none of the other secondary symptoms.”

The importance of an early recourse to the external use of cold water in this fever, on which Currie laid so much stress, ought to be felt and acted on by every practitioner of medicine. The sedative effect of cold will be salutary in proportion to the genuine excitement of the capillary system of the membranes, and becomes less useful if not of very equivocal benefit, after they are weakened by protracted excitement and inordinate action. Hence it is that in the more advanced stages of this disease, the capillaries, having acquired the habit of morbid distension, will not readily recover their wonted diameter and elasticity; even after the morbid stimulus of heat has been removed, and the nervous sensibility abated by the cold bath. There is some risk in persisting at this time in the use of this remedy. It may add direct to indirect debility of the capillaries, and deprive them of the power of resisting the *vis à tergo* of the blood in the

larger vessels. The sensations of the patient, if the heat still continue inordinate, will be indeed more agreeable after the cold bath, but for the reasons just given, the disease will be far from being subdued.— Indeed we should have reason to fear that the inertia and torpor of the already weakened capillaries caused by the cold, might end in death of the parts, viz. either of the skin, or of the mucous membrane with which it sympathizes, or portions of both. It is in this advanced stage of the fever, or in cases where the morbid action was evinced in the skin of the face and neck and over the stomach, while that on the limbs is cool, that I have found sponging the heated and flushed portions with cold water, or immersion in the tepid bath from 80° to 90° so serviceable. We still abstract heat and moderate excitement by these means, but we do it less violently and with less risk of dangerous torpor or death of the membranes. This chain of reasoning and the practice based on it are mainly applicable to fevers with cutaneous eruption, in which the skin is so far interested as to undergo structural change and disorganization, as in scarlet fever, small pox, measles, and erysipelas. In the gastro-cerebral fevers, on the other hand, known by the names of remittent, bilious, yellow and typhus, we are called upon for less reserve in the free application of cold to the skin, in the second stage. The cutaneous excitement is high and persistent for many days, and allows of, and requires free and repeated cold affusion or ablution.

In *Small Pox* I have not found cold bathing, by either affusion or ablution, of that benefit which I had been prepared to expect from the favourable notices of the practice by other writers. I have elsewhere recorded my opinions on this subject, when giving a

history of the small pox epidemic which prevailed in this city in 1823 and 1824*.

“The application of cold water to the skin was tried by us on the strength of its alleged good effects in this disease, but in no case had we reason to be satisfied with it. The state of the cutaneous surface, during the vesicular and pustular stages, is such as to prevent its transmitting the usual impressions to the interior. Cold may deaden it and hasten the disorganization of its tissue, but cannot arrest and suspend morbid capillary action here, as in ordinary fevers or diseases with great local determination, as to the head, &c. If useful at all, it will, we apprehend, be in the forming stage of the disease, before the skin is altered by the eruptive effort.”

The false pathology so long prevalent respecting eruptive diseases in general, and more especially those of the acute exanthematous kind, has led to very erroneous modes of practice, among which stands conspicuous for its mischievous effects the free use of cordials and other stimuli, and external heat. It was alleged, that it was necessary to bring out on the skin the morbid and peccant matter, which, if pent in, would kill the patient, or produce, at the least, the most dangerous disturbances of internal parts. Our present improved knowledge of the state of the membranes, and the order and succession of their morbid changes, teach us that in proportion as any one of the three surfaces, pulmonary mucous, digestive mucous, and cutaneous, is irritated, the others are proportionably disturbed in their functions; and that the means of moderating the

* North American Medical and Surgical Journal, Vol. II, p. 51, 52. Article by Drs Mitchell and Bell, attending physicians to the then Small Pox Hospital.

excitement of one of them, in acute disease, is to allay that of the other. Hence we find, that irritation of the stomach precedes the eruption on the skin of small pox, and that in proportion to the intensity of the former, as in drunkards, debauchees of either sex, or where intemperate stimulation has been erroneously had recourse to as a preventive, that the latter or cutaneous eruption is more unseemly, unmanageable and malignant. The chances, in such cases, are also greater, that the lining pulmonary membrane will become affected with pustules of small pox resembling those of the skin—a result which I have often witnessed in those dead of this formidable disease. If, again, the skin, when thus covered with eruption, be stimulated by much clothing and hot air, the state of the pulmonary and digestive mucous membrane, that is to say, the pulmonic and gastric symptoms will be aggravated. I speak now of the acute form of the exanthemata, when all the sympathies are direct and active. The treatment of these maladies ought, one would suppose, to have been long ago based on a theory which is the direct summing up of morbid phenomena. But the onward march of truth is slow. Isolated facts in therapeutics abounded, but they were, in a measure, valueless until they had been collected, and arranged, and illustrated by sound physiology. Upwards of a century ago, the internal use of common cold water in scarlet fever, small pox, and measles; and instances of the efficacy of this simple means to restore repelled eruption and bring on sweat were pointed out* ; and

* *Febrifugum Magnum*, or, Common Water the best Cure for Fevers, and probably for the Plague. By John Hancocke, D.D., Rector of St Margaret's, Lothbury, &c. London, 1723.

yet to this very day the traditional faith in exclusively internal drugging and external heat maintains its ascendancy with the crowd—the great and little vulgar, including many a physician.

Of later years we are, however, not without examples of the success attending the use of cold water to the skin, in measles. Among the most recent accounts of this nature is that given by Dr Thaer, a Prussian physician. In an epidemical visitation of measles which occurred in the neighbourhood of Berlin during the autumn of 1825, this gentleman directed the use of ablution with cold water and vinegar in sixty-eight cases. Out of these, there was but one death, and that was of a person in whom there were pulmonary tubercles, and in whose case the ablution had been practised contrary to the advice of the physician. Contrasted with this favourable result, was the fact of eleven deaths out of fifty-two sick of the same disease, but on whom the remedy had not been used. It was remarked, that the children who had been bathed were, for the most part, perfectly cured in the space of eight days; the desquamation was less extensive and more rapid in its course after the ablutions; the convalescents exposed (contrary indeed to Dr Thaer's orders) did not experience, on that account, any inconvenience, although they had some remains of cough. When the irritation of the lungs had lasted some time, copious expectoration supervened after the use of the cold lotions; and when the pulmonary disease was in its incipient state, it was cured without expectoration so soon as the functions of the skin became regular. In three patients, the eruption was observed to come out immediately after the use of the lotions; although, prior to this, there had not been the

slightest evidence of it; and whenever the eruption appeared, the other symptoms were considerably moderated in violence.

The conditions for prescribing cold abluion in these cases were, 1. That the temperature of the body of the patient should be above 98° Fahrenheit, and that there co-existed restlessness and shortness of breath. 2. That the water for abluion should be colder in proportion as the body of the patient was hotter. Dr Thaer was, in this respect, regulated by the table of Fröelich which he always carried about with him, together with a small thermometer, the bulb of which he placed under the axilla of his patient. 3. That sponging or abluion was never to be resorted to when the little patient was in a tranquil state, or perspiring*.

I shall here introduce the table of Fröelich which will serve as a useful guide to direct the practitioner in the employment of bathing, and also as an apt illustration of the principles on which the remedial powers of the bath must rest. The greater the heat, and the higher the excitement, the colder is the water and the longer the period of immersion: a practice perfectly in accordance with the creed which admits the direct sedative power of cold, but contradictory and absurd, if we suppose with Currie and others the stimulating power of this agent.

* North American Medical and Surgical Journal, Vol. VIII, p. 414, 415.

Heat of the body by Fahr. Therm.	Temp. of the water by Fahr. Therm.	Duration in minutes of the Ablutions.	Baths.
98	90½	4	...
99½	85	4	...
100	75	4	1½ to 1
101	65 to 70	6	1 to 2
102	60 to 70	4 to 6	2 to 3
103	60 to 70	8	6 to 8
104	60	...	3 to 4
105	55	...	2 to 3
106	40	...	1 to 3
107	40	...	1 to 3
108	35	...	3 to 4
108½	35	...	3 to 4
109	35	...	3 to 4
110	35	...	3 to 4
111	35	...	3 to 4

In fevers vaguely called *miliary* and *petechial*, that is in fevers, in which petechial or miliary eruptions have been a common, though not an essential symptom, cold affusion has been used with advantage. Giannini, who speaks of the remedy in such strong terms of eulogy in the hot stage of intermittent fever, confirms the favourable opinion of it, expressed by Currie, in the diseases now under consideration. When resorted to at the first invasion of the fever, cold immersion will often cut it short and prepare for prompt convalescence. Even when the disease is advanced, either it or cold affusion is still an agreeable remedy, and will prove the most successful palliative. The conditions already insisted on are to be attended to here, viz: to select the epoch of the paroxysm, where the fever is intermittent, and of the exacerbation, when of a remittent character, and in which the heat of the skin is greatest.

In conclusion of this part of the subject, we may say, in the language of Hegewisch—that affusions of cold water may be used when the heat exceeds the standard temperature of the body, and then only in

the acme of the febrile heat, never during the cold stage; the skin should be dry, not moist, much less covered with sweat. The remedy is best adapted to fevers arising from contagion, and should be used as soon as possible after their invasion, and best of all in the first hot stage succeeding the infection: then may the disease be extinguished in the three first days—and even when it cannot be applied so soon, it contributes greatly to alleviate the symptoms and accelerate the cure.

Physicians, participating in the notions of the vulgar, that the blood was driven to the internal organs by the application of cold to the skin, were long deterred from the free use of the cold bath in *hemorrhages*. Popular experience had very early shown the good effects of cold applications in bleeding from the nose,—and ought to have been sufficient to expose the fallacy of this hypothesis. Still the extended use of the remedy to other forms of internal bleeding was exceedingly slow, and looked upon as hazardous in the extreme. Reasoning from the obvious phenomena produced by cold bathing which I have already detailed, we cannot *à priori* fail to satisfy ourselves, that, consentaneously with the diminished action and temporary torpor of the skin, are similar states of the mucous membrane of the nose; lungs, stomach, intestines, bladder and uterus, on which, respectively, take place epistaxis, hemoptysis, hematemesis, mælena, hemorrhoids, hematuria, and menorrhagia.

Cold, applied by means of wet cloths to the back of the neck or to the scrotum, is a popular and efficient remedy for stopping epistaxis or bleeding at the nose. Darwin, be it said incidentally, expresses his belief that the epistaxis of elderly people most frequently attends

those, whose livers are enlarged or inflamed by the too frequent use of fermented liquors. Among other means of relief, he mentions plunging the head into cold water with powdered salt hastily dissolved in it.

In *hemoptysis* or spitting of blood from the lungs, the cold bath, so long deemed a hazardous application, has been tried by several distinguished practitioners with the best effects. The knowledge of its efficacy in this case has been gained probably in an empirical manner—if we consider the erroneous notions prevalent regarding the operation of cold on the internal organs. But all doubt ceases by our observing that, simultaneously with the torpor of the capillaries of the skin induced by the cold bath, is that of the minute vessels of the pulmonary mucous membrane.—The collapse of the extremities of the blood vessels causes a necessary coagulum and consequent mechanical obstruction to the flow of blood: there is besides quiescence of the nerves—diminished or abolished sensation, and less afflux of blood to the part. It is obvious, however, that for the cold bath or ablution to be of marked benefit, it must be of so low a temperature and continued so long, as that it may exert a permanently depressing action on the hitherto morbidly excited capillaries of the lungs. If the remedy be of such short continuance to the skin as merely to suspend, without directly lessening the function of calorification in the part, and its vascular excitement, the reaction will be considerable, and the capillaries more distended than before. I have directed cloths fresh dipped in well water, of 52° Fahrenheit, to be applied to the chest of a patient afflicted with *hemoptysis*, and have witnessed the good effects of the cold in arresting the flow of blood without any accompanying

or subsequent inconvenience. Others have had sheets wet with cold water rolled round the chest. Giannini, among other cases, cites the one of a young man seized with spitting of blood, whom he caused to be immersed, for about a minute at a time, in water made colder by the addition to it of ice; this operation was repeated three times in the twenty-four hours, and with a speedy and happy result. He very properly directs a preference to be given to the period of the fever and of the flush accompanying the discharge of blood. But we need not necessarily wait for or expect always the cutaneous excitement. We must depress, beyond what is pleasurable or any ways comfortable, the cutaneous capillary tissue, in order to act sympathetically on the pulmonary mucous capillaries from which the blood is discharged. If by frequent returns of the hemorrhage, the patient have been much enfeebled, we may substitute affusion or ablution, in the manner already advised for immersion—to which Giannini recommends the additional treatment by frequent and copious enemata of cold water, and cold acidulated drinks. Currie says, that he has found hemoptysis may be stopped by immersing the feet in cold water, and perhaps this may be done still more certainly by a permanent application of cold to the genital parts. He found the most powerful effect to be produced by immersing the body up to the pubes in cold water, a practice which, he adds, he can from experience speak of as often safe and efficacious in this disease.

If any doubts of the fallacy of the common hypothesis, which supposes a driving of the blood from the external to the internal parts, and from the extremities to the trunk, when cold is applied to the skin

or to the feet, should exist in the mind of the reader, they ought to be dissipated by the cases mentioned by Currie. Immersion of the feet, or of the lower extremities entire in cold water, should, according to vulgar belief, by repelling the blood from these parts, precipitate it with increased force and quantity on the chest and head, and aggravate rather than benefit in hemoptysis and epistaxis. That very different effects result is at once a proof of the false doctrine so long prevalent on this subject, and evidence of the correctness of the view which I endeavour to inculcate.

In vomiting of blood, and in hemorrhage from the bowels, and hemorrhoids or piles, and uterine hemorrhage, although cold affusion or even a short immersion in cold water will be serviceable, where the circulation is much increased in frequency and the augmentation of animal heat considerable, yet, generally speaking, we are content with local ablution or cold compresses over the region affected.—In hematemesis, cold, by frequent sponging or wet cloths, is applied to the epigastrium—in intestinal hemorrhage, over the abdomen generally—in vesical hemorrhage and in piles, to the sacrum, perineum and groins, and to the rectum by means of injections of pure cold water. The farther addition of cold cloths to the pubes is proper in bleeding from the bladder. In uterine hemorrhage, a cold hip bath—that in which the patient is seated in the water with the lower limbs out of the bathing vessel—is very serviceable; or in place of this, recourse should be had to cold applications by means of ice or cloths wet with cold spring water to the loins and sacrum, or small of the back—also to the perineum and groins, and by injections of cold water to the rectum and vagina.

We have both the weight of theory and direct experiment to confirm us in the belief, that if the premonitory symptoms of occasional chilliness, followed by flushings, and heat in the neighbourhood of the part, with some thirst and disinclination to motion, were attended to and met by rest, untying every ligature or band which compressed the body or the limbs, and by cool air and cool simple drinks and cold applications to the particular region affected, most of the hemorrhages which prove so alarming and dangerous might be prevented, and the person soon restored to health. I have no hesitation in saying, that piles may be greatly mitigated and often entirely removed by twice or thrice daily sponging of the parts and the small of the back and the groins with cold water, provided egregious excesses in regimen be avoided. An acute attack of this disease is to be treated like other inflammations—few remedies are so promptly useful in it as a full bleeding from the arm.

The intimate relationship between hemorrhage and inflammation, evinced in the preliminary symptoms and subsequent structural changes, is well seen in hemorrhoids, in which we have each of these morbid states in succession, and we might say alternation. The tumor, heat, and pain of the part, constituting true inflammation, are often mitigated by bloody discharge or hemorrhage—making what is called the bleeding piles. The relief is, however, but temporary, and the symptoms of inflammation reappear, or pass into those of a chronic character, during which thickening of tissue shows itself. I make this pathological remark with a view of fixing more distinctly the reader's attention on the question of cold in the phlegmasiæ, and of pointing out the

confidence with which from analogy, were direct facts wanting, he would be led to direct cold bathing in this class of diseases.

Currie, under the erroneous idea that cold was a stimulant, necessarily treated of it in an empirical manner. He feared to use the cold bath in what he called inflammatory diseases, and yet he found the remedy most and mainly efficacious in the stages of high excitement—those most nearly approaching to if not directly caused by inflammation—such as typhus, the hot stage of remittent and intermittent fever—scarlatina, and finally hemorrhage. When this author spoke of the stimulus of sensation, created by cold counterbalancing the subtraction of the inordinate stimulus of heat by cold, he advanced a proposition not tenable on the ground of correct physiology. We may have increased activity of the nervous system, or augmented sensations, without corresponding vascular action; but it is difficult, if not impossible, to conceive of the sensations or the nervous system in general being *stimulated* by cold, and at the same time one of its most remarkable functions, the secretion of animal heat, so signally *depressed* and *enfeebled* by the same agent, cold.

In inflammations, generally, we have augmented heat of the part, increased volume of the minuter vessels or capillaries, which are distended with blood, and also increased sensation amounting to pain. Cold directly applied to an inflamed part, or to a surface with which the former sympathises, will abstract the heat already excessive, and by its sedative effect diminish excitement of the nervous and capillary tissues, and of course diminish the secretion of caloric, and the diameter of the vessels. If cold be early applied, the sus-

pension of the stimulus of heat and the recovered diameter of the vessels allow the part to resume its former condition. But if the application have been delayed until the vessels have been long dilated, they will not so readily recover their former elasticity and size, even although the stimulus of heat and excitement in the nervous tissue have been withdrawn. Hence the application of cold at an early period of inflammation will be often so serviceable, while at a more advanced stage it will not only fail to benefit, but may enfeeble beyond reaction the long distended capillaries and over-excited nervous tissue, both of which had been by a continuance of the disease thrown into a state of indirect debility. Even under these circumstances we are not forbidden, however, to abstract the morbid heat, and to moderate the yet persistent though diminished excitement of the sanguineo-nervous tissue, by the use of water, not so cold as would have been allowable in the first stage, but still sufficiently cool to act as a conductor of the superfluous caloric and as a mild sedative to the excited organ.

In *burns* and external cutaneous inflammation of a somewhat similar character, such as *erysipelas* and *sun stroke*, the practice of the external application of cold must mainly rest on the principles just laid down. The water is not to be so cold as to deaden a tissue, the vitality of which has already greatly suffered—it is meant to moderate and suspend excitement but not to destroy excitability—the temperature of the fluid is also to be somewhat raised in proportion as the first inordinate excitement and pain are removed, so that water for immersion or affusion, first used at 60°, may subsequently be well replaced by this fluid at 70°, and even 80°, if the excitement, though

still morbid, be not marked by any great evolution of caloric, and powerful sensations. Much of the discrepancy of opinion and practice among surgeons and physicians, respecting the propriety of cold applications in burns, would disappear by a suitable specification of the extent of change which the tissue has undergone by the fire, and the graduation of the cold to the excitement of the part, and the extent of sympathetic irritation of the heart and circulation. Thus, where the skin has been disorganized by a burn, cold cannot be beneficial; but where there is redness and intense pain without abrasion and loss of tissue, the cold bath or cold applications, used in the manner above mentioned, will often afford signal relief. The cases, including experiments on himself, detailed by Professor Dzondi, are conclusive on this point.

In the burning of the skin from exposure to the sun's rays, and in the accompanying phenomena of acute headach, or delirium, violent fever, and sometimes insensibility and coma, with great gastric distress and occasional retching, constituting sun stroke—repeated cold affusions have been freely resorted to in all countries and in all ages from the time of *Ætius* down to the present day with the very best effects. The inordinate heat of the skin, especially of that of the face and neck and of the epigastric region, would seem to suggest the use of this remedy to the most uninstructed. Considering indeed the frequency of this sun stroke during our hot summers, in the city and in the harvest fields, so often erroneously referred to drinking cold water, it is very desirable that people generally should be aware of the means of affording relief to the unhappy sufferer, and of the facility with which it can be procured in water from the nearest well, pump, or spring.

In those who really suffer from drinking cold water in summer, and except in the cases of the drunkard, and the habitually intemperate, the number is very small, a different class of symptoms are exhibited from those presented in sun stroke. In place of the burning heat of the skin, fullness as if to bursting of the blood vessels of the neck, face and head, inflamed eyes, inflated countenance, and full bounding pulse, seen in the latter, the surface is pale, cold and clammy, the pulse often small, hardly perceptible, and features shrunken. In addition to cold immersions or copious and repeated affusions, in sun stroke, it is often useful to apply pounded ice, or cloths dipped in water of an icy coldness, and frequently renewed, to the head and neck.

Resembling sun stroke in many respects, and like it, also, requiring the free use of cold affusions, is the *poisoning by narcotic drugs, such as opium, henbane, stramonium, &c.* The first delirium is here succeeded by stupor and slow stertorous breathing, with irregularity in the distribution of the animal temperature; parts of the skin being morbidly hot, and the extremities cold. The carotids pulsate with unusual force and frequency. The central portions of the nervous system—the brain and spinal marrow are in a measure paralysed, but the ramifications and expansions in the tissues are still morbidly active. The most pressing indication at this time is to prevent the suspension of the respiratory functions. Now, we learn from Carlisle,* and Edwards,† that, in proportion as the animal heat is diminished in the different classes and individuals of animals, the want of air is less felt and the danger of suspended respiration less immi-

* Croonian Lecture, Phil. Trans. 1804.

† De l' Influence des Agens Physiques sur la Vie.

ment. An animal, a puppy for example, which would die in half an hour from an occlusion of the glottis, produced by a section of the eighth pair of nerves, so that air could not enter its lungs, would yet survive this operation for a whole day, if it were benumbed with cold. Frogs will live from autumn to spring almost entirely under the water of marshes, ponds and rivulets, which all this time hardly exceeds 50° Fahrenheit. In hot weather, on the contrary, when the temperature of the water, and that of their own bodies, for unlike warm-blooded animals they take in a measure the temperature of the medium in which they live, is elevated, they are obliged to come frequently to the surface to breathe, and can scarcely do without continued pulmonary respiration. Applying, now, this principle to the slow and laboured breathings of persons poisoned by opium and the like articles, and still more to the suspended respiration of those in *asphyxia*, or suffocated by inhaling deleterious gases in wells, &c., we can understand how abundant affusions of cold water over the body, and cold air should be so serviceable. By reducing the excessive animal heat, and preventing in degree its formation, we give the lungs an opportunity of performing their function with less employment of power, until the system gradually recovers its energies. Cold does not in these cases, as so often alleged, act by stimulating and rousing the nervous system—it rather lessens the morbid excitement of this system, and one of its prominent functions, calorification; and by circumscribing the circle of vitality, it enables the lungs to perform for this circumscribed circle what they could

not possibly accomplish for the entire and extended one.

Whatever support the practice of cold affusions, in poisoning with narcotic vegetable substances, may receive from this theory, we must be aware that the former has long preceded the latter. Baccius recommended cold baths against the poisonous effects of the mandrake (*podopyllum peltatum*); and Sir John Floyer adds, "this hint ought to excite physicians to inquire how far and on what account cold baths can help the poison of opiates." Farther on, after describing the symptoms which are produced by swallowing the mandrake, and the relief afforded by cold baths, this last mentioned author goes on to say, "and this effect ought to oblige us to inquire farther, how far cold baths may be proper for sleepy diseases, of which kind the apoplexy, lethargy, and *incubus* may be reckoned, and the sleepiness preceding fits of the mother, and other convulsions." Again, "The seamen cure their sailors by throwing them into the sea when they are dead-drunk, which excites their stupid senses, and makes them very sober." One is surprised, that, after such experience, the use of cold affusions should be regarded as a new remedy in poisoning from opium; at any rate, that it should only get into general use of late years.

According to the testimony of Herbst and Orfila, cold affusion is the very best remedy in cases of *poisoning with hydrocyanic (prussic) acid*. Both those gentlemen found by experiments on dogs, that even after the supervention of the most alarming, and what are usually deemed fatal symptoms, from the administration of the acid, cold water freely poured on the animal thus poisoned, was the means of ob-

viating all danger, and of restoring it to its accustomed state.*

In what are vaguely called *convulsive and spasmodic* diseases, the cold bath has been greatly resorted to. As a palliative means, the remedy is generally serviceable; but if we aim at employing it as a cure, we must make a selection of cases in reference to their form and source, and the series of sympathetic irritations, before the muscles are affected. In proportion as the vascular system sympathises with the irritation of the nervous and muscular systems, will cold bathing be serviceable. Of this sympathy we become assured by the activity of the pulse, heat of the skin, and general fulness of the capillary vessels, especially those of the head and neck. In such cases, cold affusion on the head, or along the course of the spine, during the convulsive paroxysms, or even during the intervals, will often exert a decidedly beneficial effect. We have good reason to believe, that convulsions in some habits readily supervene, so soon as the brain is excited to a certain pitch by an undue quantity, and even undue impetus, without augmented quantity, of blood. It is here that cold bathing forms an admirable adjuvant to the lancet, and may in some cases, if timely and persistently used, be relied on as a good substitute for this latter. Habitual epilepsy may be cited as a disease to which this treatment can be usefully applied. But in other cases, in which the primary irritation exists in the digestive passages, and is transmitted to the brain, and thence on the muscles, causing violent convulsions without any notable increase of vascular action, we cannot anticipate much

* North American Medical and Surgical Journal, Vol. VIII, p. 422, and Vol. IX, p. 217.

relief from cold bathing. The main indication, in such exigencies, is to remove and withhold all irritation of the gastro-intestinal passages. In certain other cases again, in which an irritation at a remote point of the nervous expansion of the skin causes convulsions, as in tetanus and hydrophobia, often with very little associated vascular action—the employment of the cold bath has become a mere affair of routine, but has not been followed by results which would make it imperative on us to imitate the practice. Even in these diseases, much, however, will depend upon their duration, or the lapse of time between the infliction of the wound or local injury and the appearance of the alarming symptoms in the nervous and muscular systems. We are not allowed to doubt that, in not a few instances, there has been coming on gradually an inflammation of the spinal arachnoid membrane, on which the convulsions in tetanus and hydrophobia mainly depend. Now in the case of arachnitis of the encephalic membrane, giving rise to delirium and other disturbances of mental functions—cold applications by pounded ice to the head, and cold affusions on the same part, are often had recourse to: and it is no forced inference to anticipate, even had we not examples of success from their occasional empirical use, decided benefit from cold affusions along the spine and to the nucha. In *chorea*, which also is not unfrequently sustained by arachnitis of a sub-acute character, cold bathing has been much relied on. Dupuytren, the celebrated surgeon and professor at the Hotel Dieu at Paris, places it among the foremost, in point of power and efficacy, of all the remedies employed in this disease.

In *puerperal peritonitis*, cold applications, such as

pounded ice to the abdomen, were not long ago used in France,* and, as we learn, with advantage; but the silence, respecting this remedy, of those who have since treated of the disease, is not calculated to encourage us to repeat the trial.

Obstinate constipation and *stoppage of urine* have severally been removed by cold affusion—dashing cold water on the abdomen in the first case, and on the pubis in the second. Some have claimed for cold a stimulant power on these occasions, but as I must think without sufficient grounds. Bleeding to the extent of producing fainting, and tobacco enemata have been employed, and at times successfully, in procuring evacuations from the intestinal canal and bladder. Surely these remedies cannot be said to act as stimulants. On the contrary, they as well as cold diminish the nervous energy, and at the same time the permanent muscular contraction of the sphincters, which now readily yield to comparatively slight expulsive efforts of the diaphragm and abdominal muscles; and the retained matters are discharged. Sometimes the evacuations under these circumstances will be involuntary, owing to a complete suspension of the contractility of the muscles—a state of things analogous to what we know may be produced by excessive fear.

In *inflammations of the joints*, especially when produced by external violence or sprain, cold affusions or cold ablution, according to the intensity of the injury or the facility of applying the water, have been at all

* North American Medical and Surgical Journal, Vol. VI, p. 198. Marcus recommends cold applications to the abdomen in *peritonitis*, and Franceschi, of Lucca, tells of this remedy having succeeded in a case of *metritis*.

times freely used. The recency of the accident and the heat and pain of the part, are the chief indications for our employing cold water in a full stream. Mere stiffness and tumefaction, constituting the second or more advanced stage of the affection, will demand a recourse to the warm or even hot bath. Of the farther extension of the practice of using cold affusion in inflammations of the joints, from sympathy with other parts, as in gout and rheumatism, I shall have occasion to speak when treating of the value of the different kind of douches. But it is not necessary that we should have external signs of inflammation to induce us to have recourse to the use of local cold bathing in sprains of the joints, or rather of their fibro-ligamentous bands. When, after a violent effort of pulling or pushing, a person is suddenly seized with acute pain in the small of the back, at the sacrum and sacro-iliac junctions, soon followed by heat of the corresponding region of the skin, frequent sponging of this part with cold water will be a very soothing and salutary application. Pain in the same joints, or such weakness produced by fluor albus or piles, as makes any common effort at pushing, pulling or lifting, a cause of sprain, ought to be treated in a similar manner. Cold ablution, by sponging over the small of the back, will not only relieve the pain and unpleasant feeling of weight in this region, but also materially help to allay the irritation of the piles, and whites or other uterine disturbance.

To surgeons, the local use of cold water offers a valuable auxiliary in the treatment of *dislocations and fractures*, and more particularly in the cure of *wounds and ulcers*. French military surgery was the first to formally acknowledge the great utility

of this remedy, and to show its superiority over the farrago of applications with which vain learning had at different times tortured the wounded soldier. Ambrose Paré thought himself abundantly rich, when he became possessed of the secret of preparing a wonderful Italian balsam (*oleum cutelorum*), which was to heal all kinds of wounds. But when he saw simple water produce equally wonderful cures with those which he obtained from the use of his balsam, he could neither conceal his disappointment nor mortification; and he thought that there must be something supernatural in such surgery as this, which, for that reason, he at first refrained, on account of religious scruples, from adopting. In an age of superstition such prejudices need not surprise us, the more especially when we learn that it was common to attribute the success of the water practice to peculiar sympathies or magical incantations, which could only be wrought by a privileged few. The Latin essay of Michel Angelo Blondi on water as a newly discovered remedy in gun shot wounds (1542) served only for a moment to fix attention to the subject. The view taken of it by this author was too natural—he spoke merely of simple water, which could not be supposed to interest the people, nor produce in them the same wonderment and confidence in its curative powers, as conjured or magical water. In this respect we do not find that mankind have been much altered in their credulity and love of the marvellous. Tell them of the salutary and sanative properties of pure water, and they smile incredulously, perhaps scornfully. Render it impure by some impregnation, either mineral or vegetable—or vinous or alcoholic—then call it aqua mirabilis or balm of Gilead, or any unmeaning but yet sounding title,

and it is eagerly sought after, purchased with much silver or fine gold, and swallowed with a faith which works prodigies in the way of cures, or averments of cures, which are just as useful to the conscientious compounders and venders. Gabriel Fallopius of Venice, and after him Felix Palatius of Trebia, more properly called by his Italian name Palazzo, endeavoured to do away with the mummery of quacks and conjurers, and to exhibit simple water as a vulnerary meriting the attention of the regular surgeon, and to be employed of varying temperature according to the nature of the wound. Joubert and Martel in France, exerted themselves in the same spirit, and with such success as to obtain for the practice the formal sanction of the University of Montpellier. But nature and common sense were not long allowed to bear sway. Van Helmont with his sympathetic dressings—Giclenius with his magnetic cures—the devotees with their plaster from the *hand of God*, gradually cast the aqueous practice into oblivion; or if it were had recourse to, some wonderful mixture was introduced into the water, such as the powder of Sir Kenelm Digby, which had all the credit of success, due, in fact, alone to the simple fluid. In Italy, indeed, owing to the warmth of the climate and the instinctive necessity of frequent recourse to water for the purposes of ablution and drink, the aqueous regimen in diseases and wounds was less corrupted by the jargon of the schools or the tricks of mountebanks. Lamorier, in France, attempted once more to direct the attention of his countrymen to the subject, in an essay “On the use of Common Water in Surgery.” By a fortunate coincidence this publication appeared at the time when all France, and even Europe, was

made acquainted with the wonderful success of the practice in the case of the Duke of Orleans, who was cured of a wound of one of his hands, (which at first seemed to threaten the most serious consequences, and even to require the amputation of the arm), by the sole and free use of water by immersion and affusion of the part affected. Were the remedy less simple and natural, and to be obtained with less facility, I should not think it necessary thus to show the revolutions of favour which it has undergone in the professional world—nor to cite in its support the names of Sancassani, Caldani, and Bonneken, whose sage efforts were, however, insufficient to preserve it a place in clinical surgery. It fell into neglect, if not into disrepute, for nearly a period of thirty years. Danter, in 1780, published a valuable essay on this subject, which abounds in sound precepts and erudition. But it is doubtful whether his labours would not have been as unsuccessful as those of his predecessors, had not a fortuitous circumstance restored water to its former high rank among surgical remedies. Percy, the distinguished military surgeon, from whom I have borrowed the preceding details, tells the story as follows. On the fourth of June 1785, whilst trials were being made of the comparative merits of the canon of two rival founders, several artillerymen, among whom was Pichegru, then a common soldier, were wounded in different parts of the body. The chief surgeon, Lombard, a man of great merit, dressed these contused and lacerated wounds in the usual manner. A miller of Alsace, having heard of the accident, went to the governor of the province and succeeded so well in persuading him of his ability to render water an infallible cure for all sorts of wounds,

that the worthy magnate gave orders to have the soldiers placed under the charge of the miller, and to be dressed exclusively by him. This surgeon by intuition immediately set about washing their wounds with river water, to which he added a pinch of powder, at the same time making divers signs, sometimes with one hand and sometimes with another, and muttering some unintelligible words. The powder was nothing but common alum. The additional virtues imparted to the water by such mummery may be readily appreciated. After the wounds had been well washed and bathed, the miller covered them with linen and lint, which were readily furnished by the ladies of the city, and which he dipped in the water, still gesticulating and uttering the magical words. For fear that the charm should be broken, we, says Percy, who was himself one of the surgeons of the garrison at the time, were not allowed to be present at the dressings, except at the twelfth, twentieth and thirty-first day in order to assure ourselves of the state of the wounds. These progressively amended, and were, without much pain or any other dressing than the *prepared* water, all cicatrised in six weeks—although immediately after the accident the surgeons hesitated about the propriety of amputating the hands of six of the artillerymen, which were most lacerated. The wounds were only exposed once a day; but every three hours they were wet with the water, moderately cold, which the miller called his *holy water*. Percy makes a remark, and it is an instructive one, that, as may naturally be supposed, there was some deformity of the hands and fingers of the wounded, for want of suitable support by splints and graduated bandages.

This lesson was not lost on the French surgeons, who

found simple water in their hands as serviceable as that of the miller with all his charms and secret powder—while their entire treatment was more successful than his, on account of their using water either cold or tepid, according to the condition of the wound, and of their calling in the aid of posture and splints, to prevent pain and deformity. It is in this way that true science ever shows itself superior to empiricism. Percy, thus early acquainted with the vulnerary properties of water, did not fail to make liberal use of the remedy in the campaigns of the French armies, during the wars of the revolution. The waters of the chief rivers of Europe, from the Moselle to the Guadalquivir, have often alone formed the dressing of the numerous wounded soldiers of these armies. In Egypt itself, Larrey found the river Nile to furnish a vulnerary to the most terrible wounds. Professor Kein of Austria, while praising the use of water in the treatment of wounds, has erred in claiming for himself the honour of discovery.

Percy regards water as specially efficacious in lacerated wounds of the membranous and aponeurotic expansions, and also of the tendons; he tells us, that he has often succeeded by the external use of this fluid on limbs which were so dreadfully lacerated that it seemed imprudent to defer their immediate amputation. Immersion of the part in cold or tepid water, according to the season and present convenience; or the application of the sponges or linen dipped in water; or, in fine, this fluid, used in every fashion, prevented or moderated, when they occurred, sinister symptoms; restrained within proper limits irritation and inflammation; and favoured as good a suppuration as the nature of the parts would allow of. By such means, continues this

eminent surgeon, I obtained cures, the credit of which no other remedies could dispute with water, since it was the sole application to which I had recourse. He thinks that we obtain by the use of water all the best effects without the inconveniences of poultices—and save large sums to the public treasury. The mode of using water to a limb or other parts, by applying round or on it, as the case may be, pieces of sponge moistened from time to time with this fluid, is very advantageous—since it is sufficient to pour the water on the sponge without removing it; so that disturbance and pain are thereby prevented. Attention must be paid to the nature of the stuff which is employed as the vehicle and recipient of the water applied to the part; since if it be of linen the evaporation will be great and rapid, and the part soon becomes dry—cotton is a better retainer, flannel superior to this again, and swansdown the best of all. If the part be very sensible or irritable, we may apply moistened linen immediately on the skin, and flannel or lint saturated with water above it again. The external use of water, whether cold or tepid, is recommended on many occasions by Hippocrates, in the treatment of fractures and luxations. In tropical latitudes, a favourite and successful remedy for wounds, is the plantain leaf applied to the part, and frequently wet with water. *Trismus* or locked jaw would, in the opinion of Percy, be a much less common occurrence after wounds, if water were used to moisten the dressings and to refresh the part. Sometimes in indolent wounds, where the borders become soft or spongy, it may be well to add to the water a little common salt, or an alcoholic liquid. This remark applies to all wounds with contusions, and most gun-shot wounds are of this charac-

ter. Percy cites the success attending the employment of water, with the chill barely taken off, in several cases of gun-shot wounds of the feet; and in which there was a terrible laceration of the tendons, aponeuroses and ligaments, and fractures of bones. Except four deaths—two from fever, one from lock jaw, and one from colliquative diarrhœa—all the other wounded who were subjected to the watery treatment recovered, and most of them without ankylosis. Were it possible, says the French surgeon, for a person wounded by a bullet, or by any other violent means, in the elbow, knee, or foot, to keep the part immersed in water, during the first ten or fifteen days, we should have much fewer amputations to perform, and a greater saving of lives.

Among the English surgeons who recommend the use of cold water for the cure of wounds, we meet with the names of Guthrie, and S. Cooper. Dr Macartney, of Dublin, has introduced the practice into Ireland, and with entire success, as we learn from a paper on the subject, by Dr M'Fadzen, in the *Edinburgh Medical and Surgical Journal*, for January, 1830.* Dr M'Fadzen says, that wounds may, by water dressing, be made to heal, by what he calls the contracting process, in which inflammation cannot, he alleges, exist. They heal by means of this simple remedy from the bottom upwards, the edges at the time approaching, and leaving scarcely any cicatrix; nor is this latter endowed with morbid sensibility—it being neither hard, gristly, nor painful, like that resulting from the usual mode of treatment.

* For an account of the leading points in this paper, see the *North American Medical and Surgical Journal*, Vol. IX, p. 423—4.

The mode of applying this remedy, continues Dr M'Fadzen, is exceedingly simple, and fortunately attended with very little trouble. A piece of lint dipped in cold water is to be applied with the soft side to the part, and covered with oiled silk, which should extend considerably beyond the limits of the lint, and retained in its place by a tight bandage, or any other means the practitioner may deem proper. Any other substance capable of preventing evaporation, and sufficiently light and pliable, such as very thin India rubber, would answer the purpose as well as oiled silk. The dressing should be removed three times a day, or less frequently if the secretions from the parts are trifling, for the purpose of wetting the lint as it becomes dry, and freeing it from the secretions of the wound or skin, which would in a short time become irritating. We are not to be deceived by the appearance of moisture on the lint, for this may be occasioned by perspiration, or other discharges from the part, collected under an impervious substance. Hence the lint must be either occasionally removed, or well washed in cold water, and in like manner the oiled silk, or India rubber.

Dr M'Fadzen is disposed to refer the benefits of this treatment to the production of steam at the temperature of the surface of the body, which being retained by the impervious silk subjects the part constantly to an atmosphere of that vapour. A similar vapour arises in sponging the heated skin of a patient with fever, but we do not on that account attribute the benefits of ablution to the vaporization of water, but rather to the reduced temperature of the skin, by the direct application of the cold fluid. Dr M'Fadzen has likewise employed, with good effect, the

dressing by cold water in conjunctival ophthalmia, and sloughing of the cornea, and in anomalous diseases of the skin with inflammatory base.

Interesting information on this head will be found by reference to a paper of Dr Tillet, of Lancaster in this state, and inserted in the fifth volume of the North American Medical and Surgical Journal. The cases related by Dr Tillet are chiefly illustrative of the beneficial effects of cold water in violent inflammations of the extremities, following fractures, wounds, and other injuries. The manner, in which the water is directed to be applied by this gentleman, promises a much more decisive treatment than that pursued by the Irish physician just quoted. He directs in the more violent grades of inflammation, that the coldest spring or well water should be procured, or, if necessary, it may be cooled artificially, and the limb kept constantly bathed in it, until the morbid excitement be reduced. Dr Tillet thinks that copious affusions of cold water would be preferable to the common practice, in lacerated wounds.

On equally good authority as the foregoing, we should be free to use cold water affusions and ablutions in ulcers. I have myself adopted this treatment in such cases with marked benefit.

As still farther illustrative of the efficacy of the local application of water, I shall cite the case of an Abbé, a friend of Percy, a very learned man and a great reader. This person, finding that nothing relieved him so readily, in frequent paroxysms of the gout, as local bathings in river water, had a pair of large boots of horse hide made for himself, which, after he had put them on, were filled with this fluid, and with which he contrived, notwithstanding their

inconvenient weight, to drag with him into the library, and there look for the books to which he wished to refer.

Additional particulars, connected with cold bathing will be found in the next chapter, on *sea bathing*, and in a subsequent one on *douches*.

CHAPTER V.

Sea Bathing ; how it differs from the use of the simple cold bath. Temperature of the water of the sea shore varies with the season, weather, and tide.—Salt water slower of evaporation than fresh—deposit on the skin of saline particles, after immersion, acting as a stimulant to this part.—Season for sea bathing—period spent at the shore too short.—Manner of bathing.—Aids by machines—their comforts and advantages—not used along our coast—plunging into water head foremost uncalled for, and sometimes an injurious practice—presumed necessity of wetting the head immediately after entering the water—urged on wrong theory, though occasionally advantageous.—Swimming a good exercise and useful accomplishment—held in great esteem by the Greeks and Romans.—Public swimming schools in the different cities of Europe—not common in this country.—Swimming ought to be taught as a necessary branch of physical education—readiness with which it may be learned—it is an active exercise, and opposed to the sedative operation of cold bathing.—Caution in using it required by invalids with weak chests, inclined to hemoptysis, asthma, and bronchitis.—Time of bathing.—General rule to chose an early morning hour.—Circumstances

requiring a deviation from this rule.—The guiding principle here is to select the time when there is some febrile excitement and increased heat of the skin, unless this should be after a meal.—Absurdity of prescribing a particular hour in the day for all invalids, without reference to their constitutions and complaints.—Water less cold towards noon, or two or three o'clock, if the tide rise in the morning.—Less necessity for the healthful and robust to restrict themselves to certain times for sea bathing, except to shun it for some hours after a meal, and also after excessive fatigue or debauch.—Illustration, by cases, of the general principle, that cold bathing is improper when the system is very feeble or prostrated.—Period of immersion.—Precautions on coming out of the water as to dressing.—Moderate exercise after bathing—external warmth required by some—a light repast after the bath—headache warded off or removed by a warm drink.—Curative effects of sea bathing.—Explanation of the sense in which weakness is to be understood, and under what circumstances it is removed by cold and sea bathing.—Scrofulous habits benefited by sea bathing and sea air—necessity of attention to the quality and quantity of food by scrofulous invalids, and to regular hours of sleep.—Local application of the salt water to enlarged glands and other scrofulous swellings and ulcers.—Sea bathing beneficial in dyspepsia and hypochondriasis accompanied with flushes of heat, palpitations and other nervous disturbances—in hysteria and chlorosis—epilepsy—chorea—second stage of hooping cough—and in convulsive affec-

tions generally, when accompanied by vascular excitement—asthma—aphonia, two kinds of.—Persons suffering from febricula or slow fever from a sedentary life, or the consequence of more violent remittent fevers—also cases of obstinate intermittents, cured by sea bathing and sea air.—Sea bathing beneficial to those subject to catarrhs and rheumatism.—Tumours removed by local use of salt water.—Sea bathing injurious in erysipelatous and inflammatory eruptions of the skin, unless this surface be wiped with simple water immediately afterwards—in hemoptysis and consumption—and in strong predisposition to these diseases.—Explanation of this fact.—Bilious affections, unless depletion and diet have been previously resorted to, are not benefited by sea or cold bathing.—Substitute for sea bathing.—General remarks for invalids visiting the sea shore.

IF we merely had regard to the temperature of sea water, we should consider immersion in it as simply cold bathing; but there are circumstances connected with the act which modify materially its effects. Sea bathing is usually preceded by some exercise, a walk or a ride to the beach; it is accompanied by some muscular exertion—struggling against the waves, or, in the more robust, by attempts to swim: with others again, the whole affair is attended by a dread of danger, which powerfully affects the nervous system, and causes hurried breathing, palpitation, and increased rapidity of the circulation. The immersion also is in a fluid largely impregnated with salts. Add to these, exposure to often a cool and keen wind from the sea, which on our coast must of course be easterly,

and we can readily conceive that sea bathing presents a more complex problem for solution than the mere use of a cold bath.

The temperature of the water of the sea at the coast, varies in the same season with the tide, according as it is ebb or flow, and even then the thermometer and the feelings will be differently affected, according to the hour of the day. During the two or three summer months in which invalids and others resort to the sea shore, the temperature of the water is within the limits of what some writers call cool; that is, between 60° and 80° of Fahrenheit, and even higher; so as to some of a sanguine temperament to feel actually warm. The shock of immersion is not, of course, so great as in the cold bath, which ranges from 40° to 60° , but it is still generally felt, and is followed by the other effects described in the last chapter. The difference is in degree, not in kind, and merely amounts to the greater ability in persons whose excitement is but moderate, to tolerate the sedation of sea bathing, and to react after coming out of the water.

But there is another way, distinct from the effects of mere temperature, in which the skin is affected by bathing in salt water; and this would seem to depend on the slower evaporation of a saline than a simple aqueous fluid; and the incrustation on the skin of saline particles, and consequent mild stimulation of this surface by these particles when subjected to the common friction of the apparel. That such incrustation is really formed on the skin in consequence of bathing in the sea, one may easily satisfy himself by applying the tongue to any part of the body, even after several days have elapsed from the last time of bathing.

This slower evaporation and the deposition of saline particles, after immersion of the body in sea

water, will probably serve to explain the admitted fact, that persons, such as fishermen and sailors, whose occupations expose them to the various inclemencies of weather, are less liable to be injured by being soaked with salt water than with rain. Even people of more delicate habits observe that they are less susceptible to take cold after being wet with salt than with fresh water. Captain Bligh, in his narrative of his astonishing passage across the Pacific ocean in an open boat, makes the following observations:

“As I saw no prospect of getting our clothes dried, I recommended it to every one to steep, and wring them through salt water, by which means they received a warmth that while wet with rain water they could not have; and we were less liable to suffer from colds or rheumatic complaints.” In another place he says; “In the morning the rain abated, when we stripped, and wrung our clothes through the sea water as usual, which refreshed us wonderfully.”

In the account of the loss of the *Centaur*, by captain Inglefield, it is stated that, “by their clothes being continually wet with salt water, their bodies were in many places chafed into sores.” If so considerable an effect as ulceration be found to result from the permanent application of water impregnated with salt to the surface of the body, it is surely fair to infer, that some degree of salutary excitement of that surface may be produced by frequently-repeated immersion in the sea during a more limited time.*

Dr Currie carries too far his belief of the saline ingredients in sea water counteracting the agency of its diminished temperature, when he says: “Thus by

* Buchan's *Treatise on Sea Bathing*, with remarks on the use of the Warm Bath. London.

the stimulating effects of sea salt on the vessels of the skin, the debilitating action of cold is prevented. Persons immersed in salt water preserve the lustre of the eye, and ruddiness of the cheek, longer than those in fresh water of the same temperature, and exhibit the vital reaction stronger, when removed from it." This sentence is the more remarkable as containing, in the phrase "debilitating action of cold," an express contradiction of the opinion elsewhere insisted and enlarged on by the author in his *Observations &c.* that cold is a stimulant and tonic.

After all, the stimulus of sea bathing is not that of the salt in solution, of course not of the sea water, but of the salt deposited and left on the skin after drying. It follows, that the excitement produced by this means is secondary, and cannot modify the direct and immediate effects of immersion. These are such as must necessarily be experienced from other varieties of cold bathing : and such as have been described in the last chapter. The principles then, which are to regulate the conduct of those who have recourse to sea bathing, either for the recovery of their health or for pleasure, are not materially different from those already inculcated, when I treated expressly of the cold bath. The chief exception is in those cases in which the skin itself is the seat of irritation and disease, and in which the stimulus of the saline particles deposited during the bath prove prejudicial. Perhaps also a greater latitude is allowed in the range of chronic maladies, when we have recourse to sea bathing, on account of the slower evaporation from the skin, and consequently less cold experienced by the bather; and also owing to the stimulation of the saline particles after the skin is dried, coinciding with and increasing

the customary reaction after the sedation of cold. Still, however, much of what I have to say in this chapter respecting sea bathing will be applicable to the employment of the cold bath, and the directions and hints for our guidance in the former case will serve for our government in the latter, unless the exceptions be expressly specified.

The *season* for sea bathing, along the coast of our middle states, cannot be said to properly begin before the middle of June, and is considered as over by the first week or middle of September. Cold rains and easterly winds create a state and temperature of atmosphere which can be illy borne by the delicate and valetudinary: and such a state is apt to occur at any time before or after the above mentioned period. Indeed this class of persons are occasionally severely tried in the midst of July and August by easterly gales, which are peculiarly searching and distressing.

Fashion and custom do not allow persons to spend more than even a small part of this short season at the sea shore. By the time one set of visitors have accustomed themselves to the inconveniences of confined lodgings and crowded tables, and have learned to divide their time with the least discomfort to themselves, and have begun to ascertain the salutary effects of sea bathing, they think it necessary, forsooth, to move off, to be followed by another set, like wave succeeding wave in the ocean before them. All this is adverse to the intention with which so many leave home; and hence we need not wonder that they return disappointed and little benefited, either as regards a recovery of their health and strength, or of their spirits. Time is not allowed, during such a short stay, for breaking up the habits of indolence, enervation, and

cares in business, and for substituting in their place those of healthful recreation, by regular exercise and looking abroad on external nature for materials of amusing thought and reflection.

Sea bathing is a remedy which may be traced to very remote antiquity. The Greeks had so general an esteem for it, that Aristophanes, in the comic scene of leading Plutus to the temple of Esculapius, to cure him of his blindness, has chosen sea bathing as the remedy. According to Suetonius, the water of the sea for the purposes of bathing was first introduced into Rome by Nero.

Sea bathing, like the cold bath, may be divided into general and topical: in the former, the whole body is immersed, or exposed to a shower or affusion of water; in the second, it is applied to a particular spot or part. My remarks will be, first, on general sea bathing, and these will be made under the three several heads of *manner, time, and curative effects.*

Manner of Bathing. As regards the facilities and aids for bathing along our sea coast, little can be said in their praise. We have borrowed none of the plans for bathing machines, which, either floating or allowing of limited movement on the beach, are so common along the English coast. The objections made to their use with us, on account of the rapid rise of the tide and violent surf, do not certainly apply to all our watering places; and even where these difficulties are present, a moderate share of ingenuity would suffice to obviate them, and add greatly to the comfort of those who resort to the sea shore for bathing. In the case of females and children, the bustle and alarm of open bathing on the shore, little moderated by the officious interference of some rough Meg

Merriless or Long Tom of a guide employed for the occasion, must appear in strong contrast with the quietness, privacy, and sense of security enjoyed in a machine consisting of a dressing room above and a bath below, to which one descends by steps in the direction of the sea. Here, properly sheltered, the bather, without fear or undue haste, can enjoy immersion, and even exercise the limbs with some freedom. If a man, he has it in his power to pass at once into the open sea, and desport himself with swimming, as the side of the bathing shed in that direction does not come down quite to the surface of the water. The machine is let down along an inclined plane, or kind of rail road, sufficiently far into the sea to allow the water to be of a suitable depth in the bath; and at a given signal it is drawn up again on the beach: or it may rest on wheels, so as to admit of its being readily propelled into the water, and when required drawn out. In place of the wooden shed, adjoining the dressing room, a simple awning of canvass might be substituted, which while it protected the bather from the sun and rain, and insured the requisite privacy, would allow of more light, and give the bath a more cheerful appearance. But for fear the reader should suppose that there is no pleasure in the present method of bathing at our watering places, I must add, on the testimony of ladies themselves, to whom, in general, the arrangements which I have criticised would seem most objectionable, that they would not exchange the dashing of the breakers and the pleasing fear, which their bursting over their heads occasions for all the quiet and security of a calm sea and smooth beach, even with the additional comforts of machines. They describe the scene as quite exhilarating, in

which they enter the water, in a line, hand in hand, and breast the advancing wave—while giving and receiving assistance, and responding to each other's exclamations and bursts of laughter, at the ducking of those over whom the surf shall take a more especial fancy to break against. Doubtless there is only wanting the pencil of an Albano to make us duly sensible of the picturesque appearance of groups like these, assured as we are of the individual loveliness often met with in them. The sameness of costume might be compensated for by the variety of attitudes into which it is presumed the fair bathers would be involuntarily thrown.

After alluding to the expressions of repugnancy and horror from the fair sex, at the idea of being dragged head foremost into the water by the guides at the English watering places, Dr Buchan adds, that the proper office and duty of a guide is surely very obvious, and consists solely in taking care that no accident befalls the timorous or the imprudent, while descending from, or returning into the machine, or during the time they remain in the water.

We can account, however, for this conduct of the guides, from the practice of plunging head foremost into the water, where circumstances permit, being generally advised: but on what principle we cannot so well discover. It is not improbable, that some of the kinds of headache attributed to bathing in reality originate from this precipitate plan of immersion. The occurrence of the pain may be explained by the mechanical violence with which the head strikes the water; by the unnatural attitude in which the body is thrown, the heels being upward and figuring away in the air like the dancers at Communipaw; and, finally, by the

holding of the breath at the time, and the consequently suspended return of blood from the head.

But we can, perhaps, trace the origin of this practice to the prevalent idea of the necessity of wetting the head as quickly as possible after entering into the water. Whatever may be the effects of this fashion, they are not, I think, explicable by the hypothesis so generally adopted by medical writers—that unless the head and the upper parts of the body be speedily wet, the blood is driven to this part from the lower extremities by the cold of the medium in which they are immersed. Having already displayed the want of foundation in fact and theory of this explanation, I shall not now resume the question. As far as regards mere sensation and the effects following a partial exposure of the cutaneous surface to cold, it may be admitted that the sobbing is almost always most harassing while one half of the body is under water and the other remains exposed to the air—and hence the more speedily the whole of this process is performed, the less will the person be affected with convulsive respiration.

It may happen also, that individuals, in whom there is habitual determination to the head, with a sensation of fulness and throbbing temples, and who, at the same time, suffer from cold feet, require a more decided abatement of vascular action of the head than would ensue on simple immersion of the lower part of the body. The inequality of circulation is not removed by this latter process, and it requires the direct application of a cold or cool fluid to the part, and some consequent evaporation in order to diminish effectually increased and, for the time, we may call it, morbid action of the blood vessels of the brain and

head generally. Hence we can conceive how the wearing of a covering on the head, while a person is in the water, should prove very prejudicial. Buchan relates cases of headache, drowsiness, and other unpleasant feelings which had been felt by persons who wore a cap during the time of their bathing, but who were soon relieved of all such after they discontinued the use of this covering. "In one gentleman, the intimate connexion between this complaint and the exposure of the external surface of the head to the influence of the water was exemplified in a singular manner. If he enclosed his ears within the cap, he was generally affected with the headache, which he never experienced when he took the precaution to leave these parts uncovered." When speaking of the general effects of sea bathing, I shall have occasion to mention another kind of headache to which the delicate and infirm are subject from the coldness of the water, or remaining too long in it.

Connected with the details respecting the manner of bathing, is the exercise of *Swimming*. There is this important peculiarity, however, in the latter, that it is not merely an agreeable recreation, but it is also an accomplishment by which life is often saved, and moments of extreme anxiety and agonizing fear are converted by the bold swimmer into a season of rejoicing and thankfulness, at the escape through his exertions, of many a helpless fellow mortal from a watery grave: while he himself enjoys the consciousness of security when bathing on the sea shore, or crossing the rapid river, or sailing over the blue lake.

It should be rather a matter of surprise that the moderns pay so little attention to the art of swimming as a part of education, than that it was held in such

high estimation by the ancient Greeks and Romans, who, when they wished to convey an idea of the complete ignorance of an individual, would say of him, that he *neither knew how to read nor swim*—a phrase corresponding with our familiar one, that such a person, poor fellow, knows not how to read or write. Attached to, and forming a part of the gymnasium and palestræ were schools for swimming: and according to Pliny, the Romans had basins in their private houses, for the enjoyment of this exercise. At the present time, there are several swimming schools in Paris, Berlin, Vienna, and Copenhagen.* In one at Paris, on the left bank of the Seine, the temperature of the water is maintained at a suitable elevation to allow of its being regularly resorted to during the coldest season. It exhibits a basin ninety-six feet long by thirty wide; its greatest depth is eight, and the least five feet. There is an establishment for learners to swim, on a large scale, if I am rightly informed, in Boston harbour, which, for some years, was under the direction of Dr Lieber. We have had such in the Delaware, opposite to this city, but without the benefit of that regular and systematic superintendence essentially required for the younger class

* By the new system of Captain Clias, swimming is taught with much greater facility and in briefer time than formerly. In the year 1818 there was formed, in the central school of Denmark, one hundred and five masters, destined to teach, in the different cities of that kingdom. All of them having been instructed after the same method learnt in less than four months to swim a distance of nine miles, to dive twenty feet deep, and even to swim a considerable distance in full dress and arms, carrying a man on their back. In the different swimming schools of that country, 2707 individuals have learnt to swim perfectly in the same year, and almost every one of those Institutions, on the continent of Europe, offers the same satisfactory result. —*Clias on Gymnastic Exercises.*

of the population, who usually resort to these places. We are also deficient in means and arrangements for keeping open a swimming school during the winter—or even during that portion of it when the river is not closed by ice. The advantages from a swimming school are not, however, any more than those from a gymnasium restricted to the young alone. Adults, including even invalids with proper precautions, might resort to them, and either learn to swim or keep up a knowledge already acquired.

Surely, says a popular writer on gymnastics, it may be called a duty of parents to attend to this part of the physical education of their children. Is it not truly pitiable to see the smallest animal find its safety in crossing rivers, and in sustaining itself on the water for hours, whilst man, the king of animals, so proud of his knowledge, may be drowned in a brook, if he has not learned to swim? Societies and institutions for the recovery and resuscitation of drowned persons are very praiseworthy; but would not humanity be the gainer, if adjoining to each of the establishments of this nature, a swimming school were to be opened, in which persons of all classes and ages might learn to save themselves from drowning.

Were children accustomed from their infancy to the water, they would probably learn to swim earlier than to stand upright. A tub of adequate and it might still be moderate dimensions ought to be part of the furniture of every nursery, for the purpose of allowing the children the facilities of daily or twice daily immersion in water—cool, tepid, or warm, according to the season and their constitution; and also of accustoming them to amuse themselves and make the preparatory movements for swimming. In the

accounts of the inhabitants of the Sandwich and other islands of the Pacific, we are told, that when one of their canoes happens to be upset, the children seem to rejoice at their change of element, and swim about without any symptoms of alarm. The Caribs were also dexterous swimmers. Mothers, in case of a boat being overset, were able to support themselves on the water with their infants at the breast, whilst the men were employed in putting the boat to rights and emptying out the water.

Swimming is for most persons an active exercise—by which respiration and muscular movements are greatly accelerated, and the evolution of caloric as a consequence induced. It is, of course, essentially opposed to the sedative operation of the cold medium in which the body is immersed at the time. Invalids, able to swim, even during a few minutes' stay in the water, need have less hesitation in venturing to bathe—although the excitement of the system generally and heat of skin be little above the natural standard. An exercise of this nature would be prejudicial to those who have suffered from spitting of blood, or are subject to asthma, chronic catarrh, and incipient consumption. To prevent misconception on this occasion, it will be necessary for the reader to bear in mind the collapsed condition of the minute or capillary vessels of the lungs, which offers impediment to the free course of the blood through these organs. Now, the effect of swimming being such as to accelerate the heart's action and the current of blood through the lungs, the resistance offered by these collapsed capillaries would endanger a rupture of these vessels, or of those in which the blood would be accumulated immediately behind them. At the

least there would be a forced distension of these capillaries, already temporarily enfeebled by the cold of the water, and probably subsequent symptoms of asthma or bronchitis. We can understand this state of things, by referring to our sensations of obstruction and tightness at the chest after fast walking or sudden muscular exertion in cold frosty air—at a time when the capillaries of the respiratory surface are nearly in an analogous state to what I have described them to be when the body is immersed in a cold bath. The inference I wish to draw from this is, that although moderate, and even active exercise in an atmosphere of a temperate heat is useful in certain cases of impeded respiration, or weak chest, as we say familiarly, yet it by no means follows, that similar exercise should prove beneficial, or even harmless in very cold weather, or when the body is immersed in cold water.

It is sufficient, then, for us to beware, without entering into farther details at this time, that the person who moves about freely in the water, and still more who swims during the period of bathing, resists better at the moment the sedative operation of the cold, and will be more likely to experience a salutary reaction and glow after coming out from the water, than if he had remained still during the same time.

Time of Bathing.—A rule of the most general, if not universal application, in regard to the hour for bathing, whether in common or sea water, warm or cold, is, that it should be before a meal, and never on a full stomach, or during the first stage of digestion. By general consent, the morning is preferred for sea bathing, and rightly enough; but it would be erroneous to suppose, as some do, that it is impossible to bathe

too early, or that no other time of the day will answer for the purpose. This point cannot be properly examined and understood unless we carry with us a just appreciation of the primary operation of sea bathing, and of the constitution and temporary state of body in which it is usually resorted to with advantage. Sea, as a variety of cold, bathing is directly sedative—of course, is best tolerated by the sanguine, the vigorous, and the robust among the healthy, and by those labouring under febrile excitement among the invalids.

With this understanding of the case, we are safe in directing invalids or valetudinarians to bathe before breakfast, if they rise with a warm, and even hot skin, and reach the water before they can be said to have lost the warmth of their bed. This advice must not be understood to apply to those who awake in a perspiration, or whose skin at the time is moist with sweat. Bathing, under such circumstances, would be injurious. In a few words, the rule is, to bathe when the skin is warm, or hot and dry, and not when it is cool, chilled, or perspiring. The following remarks of Buchan convey useful admonition on this point. "I have frequently been shocked," he says, "at seeing delicate invalids of both sexes, apparently just risen, and before the vital functions had resumed their proper energy, standing, pale and shivering, on the bleak beach, or waiting in a bathing room, chilled by streams of cold air rushing through opposite doors and windows, and expecting, apparently, with a degree of horror, their turn to go into the water. From bathing in this state of the body and mind, no possible advantage can be derived."

Persons, says the same writer, in feeble health,

should content themselves with a walk in the open air before breakfast, nor should that be continued beyond the first sensation of fatigue. The time of bathing ought to be postponed until past noon, or at least, some hours after breakfast, when the digestion of that meal may be supposed to be terminated; and such a degree of exercise should always be taken previously to entering the water, as may be sufficient to produce a general sensation of warmth over the whole body. These observations are by no means intended to dissuade from the practice of early rising; no maxim respecting the preservation of health being more universally true, than that every moment passed in bed after the termination of natural sleep tends to debilitate. With a view to promote the practice of early rising, a certain physician used to tell his patients, that they would derive no advantage from the water, except they bathed previous to a particular hour in the morning.

The condition required in the preceding paragraph, that a general sensation of warmth over the whole body should be felt before bathing, conveys, in a few words, the cardinal doctrine on the subject. We may go a little farther, and aver, that unless in the course of the day there be some morbid excitement, a little feverish heat and irritation complained of by the invalid, cold or sea bathing will be productive of very little good effect, and will rather do injury. Languor and chilliness, which forbid recourse to the bath in the morning, equally forbid its use at any time in the day. While, on the contrary, the time of increased heat and flushing is precisely that in which the bather ought to visit the beach—with this important proviso, however, that this time does not

correspond with the first period of digestion, or that immediately succeeding a meal.

In laying down the rule, therefore, that cold and sea, like all other kinds of bathing, are best practised on an empty stomach, it by no means follows that we are of necessity tied down to an early morning or noon hour, without regard to the hour of repast, or our sensations at the time, or the correspondence between this hour and a state of bodily excitement, or the reverse. A person who takes a light breakfast may bathe three hours afterwards, without prejudice, as far as regards having taken a meal. Or he may, if feeble and languid during the day, with a cool skin and slow circulation, defer the operation, until late in the afternoon or evening—provided, always, that he has eaten a light and small early dinner. With due attention to this last condition, we should not err in preferring the evening to the morning for bathing, on account of the greater probability of the system being in a state of some febrile excitement during the former than the latter period. It will often happen that a person who suffers all day from languor, headache, and vague pains in the limbs after bathing in the morning, will, if he have recourse to the practice in the evening instead, spend a tranquil night, sleep soundly, and awake in the morning with additional alacrity and strength, prepared to move about and take free exercise during the remainder of the day.

Considering the great diversity of constitutions and ailments of those who resort to the sea shore for health, and the different hours at which the febrile excitement comes on, we cannot but be struck at the absurdity of all of them going to the beach to bathe at

the same hour—marching at a given signal, like so many recruits in the hands of a drill serjeant.

Another consideration here presents itself. If machines are not used, the time of bathing must be in a measure regulated by the state of the tide—and according as this varies the temperature of the sea will undergo changes. It has been observed that when high water occurs about two or three o'clock in the afternoon, the temperature of the sea is from ten to twelve degrees above what it was at low water at eight o'clock in the morning of the same day. The explanation of this phenomenon is to be found in the heat acquired by the sand exposed to the sun during many hours in the morning, being imparted to the water of the advancing tide which touches the sand in strata or sheets, and is easily affected in this way. The strata thus warmed, expand and rise to the surface, and continue to advance foremost till they reach the limits of high tide.* A variation of this nature can only take place during fine weather. The agitation occasioned by a storm mingles the deeper water, to which the influence of the sun has not penetrated, with that of the surface, after which the general temperature of the sea is found to be lowered. In winter the reverse takes place.

This fact is of some importance for invalids to be apprised of, since by selecting a proper situation, a sandy rather than a rocky or shingly beach, and bathing in a flowing tide, about noon, or rather an hour or two afterwards, they have it in their power to use a bath ten or twelve degrees warmer than at a more early hour in the morning. We can readily conceive

* Buchan, *op. cit.*

that the sea water in the morning would prove too sedative and enfeebling to some, in whom there is little excess of caloric and augmented and general excitement, whereas that at noon, or some time after it, would just be of a temperature calculated to reduce the system to its healthy level, and prevent the coming on of evening fever.

Persons in full health, who resort to the shore for variety and pleasure, need not be very particular as to the hour when they bathe, or the period during which they remain in the water—provided that they do not enter the water immediately after a meal, nor during the state of lassitude produced by excessive bodily exertion, or by undue indulgence in much eating, and drinking strong liquors. The general debility and torpor of the nervous and muscular systems consequent on excesses of this nature, will be readily increased by immersion of the body in cold water. It would be a very different thing to plunge into the sea during a paroxysm of drunkenness, when there is excessive action of those organs, which in the period of returning sobriety become enfeebled and exhausted of their excitability and power of reaction. After any aberration from the rules of temperance, prudence ought, says Buchan, to enforce the propriety of desisting from the use of the cold bath for some days. Opportunities of personal observation have convinced him that no year passes without some victims to the neglect of this necessary precaution.

The same arguments tend to prove the impropriety of rushing into the sea immediately after a long and perhaps a fatiguing journey. The following will serve as a salutary caution on this head. A gentleman, being engaged on a shooting party, had prolonged his

amusement to a late hour in the evening, without taking any refreshment. Exhausted with hunger and fatigue, he made a hearty supper, and without much exceeding his usual quantity of wine, a degree of intoxication, owing in a great measure to the previous abstinence, rapidly took place. Next morning, with a view to remove the languor which is the consequence of such excesses, he determined to bathe. The moment he emerged from the water, it seemed, to use his own expression, as if his head were about to explode. With considerable difficulty he regained the bathing machine. An intense headache, accompanied with a painful and torpid state of the limbs with total aversion to food, continued during the whole of the day; and several weeks elapsed before he became perfectly free from a kind of stupor, and recovered his usual state of health.*

The relative effects of the cold bath, according as it is used during and after much exercise, are well set forth in a narrative which I shall transcribe from Currie.

“On the first of September, 1778, two students of medicine at Edinburgh set out on foot on a journey, a considerable part of which lay along one of the rivers of Scotland. They started by sun-rise and proceeded with alacrity in the cool of the morning. At the end of eight miles, they breakfasted, rested for an hour, and then resumed their journey. The day grew warm as it advanced, and after a march of eight miles more, they arrived heated, but not fatigued, on the banks of the river above-mentioned, about eleven in the forenoon.—Urged by the fervor of the day, and tempted

* Buchan, *op. cit.*

by the beauty of the stream, they stripped instantly, and threw themselves into the river.—The utmost refreshment followed, and when they retired to the neighbouring inn, this was succeeded by a disposition to sleep, which they indulged. In the afternoon they proceeded, and travelling sixteen miles further at a single stretch, arrived at the inn where they were to sleep, a little after sun-set.—The afternoon had been warm, and they sweated profusely; but the evening was temperate and rather cool. They had travelled for some miles slowly, and arrived at the end of their journey, stiffened and weary with their exercise.

“The refreshment which they had experienced in the morning from bathing induced however one of them to repeat the experiment, and he went perfectly cool into the same river, expecting to relax his limbs in the water, and afterwards to enjoy profound sleep. The consequences were very different. The Tweed, which was so refreshing in the morning, now felt extremely cold; and he left the water hastily. No genial glow succeeded, but a feverish chill remained for some time, with small frequent pulse, and flying pains over the body. Warm liquids and friction brought on at length considerable heat, and towards morning perspiration and sleep followed. Next day about noon they proceeded on foot, but the traveller who had bathed was extremely feeble; and though they had to perform a journey of a single stage only, as some part of it was difficult and mountainous, he was obliged to take the assistance of a carriage which overtook them on the road. It was several days before he recovered his usual vigour. This relation will not, I hope, be deemed of the less authority, because it is given by the person who suffered by his imprudence. It is

unnecessary to point out the application of these incidents to the doctrines already laid down."

The case of Alexander the Great, who was nearly destroyed by disease, following his bathing in the river Cydnus, is familiar to most classical readers, and has been introduced into several works on cold baths. It but serves to illustrate still more convincingly the principle, that cold immersion is improper, if not actually dangerous whenever the system is much depressed and enfeebled, and that the practice or remedy, on the other hand, is most agreeable and salutary when the heat of the body, whether owing to active exercise or disease, is above the usual standard. Alexander, after a forced march of some days, in order to gain the pass by which Cilicia was to be entered, and to save Tarsus from the flames, threw himself, fatigued and exhausted, into the cold and rapid Cydnus. The symptoms which followed were shivering, paleness and excessive coldness, and almost total insensibility; from which he was with great difficulty recovered.

To revert to the precautions to be adopted as regards the time for sea bathing. The remarks already made, respecting the impropriety of immersion in cold water, after intemperance at table or excessive exercise in walking or field sports, will apply to dancing and late hours. To use the words of an author often quoted, it may be said, that there is no small danger in the more delicate of either sex, especially of females, encountering the cold and bleak midnight blasts from the sea, in that exhausted state which must be the consequence of long-continued exertion in rooms where the air is heated, contaminated, and exhausted by the aggregated number of people, and of

lights. It is impossible that the energies of life can be sufficiently recruited by a short and probably perturbed sleep, to render the use of the cold bath, on the succeeding morning, salutary, or even safe. They, who choose to indulge in the evening bath, ought to abstain from the morning bath.

While recommending, in general, a preference to be given to the morning or noon for sea bathing, provided the requisite conditions already fully and repeatedly mentioned, be attended to, we cannot forget that youth in general and they who resort to the water merely for pleasure make choice of the close of the day. The removal of lassitude and the sense of refreshment, which are the immediate consequences of immersion in cold water, after moderate fatigue, while the sensation of the heat is yet considerable, and the profound repose of the following night, are incontestible proofs of the salubrity of the practice to the young and healthy. Nor is the practice forbidden to the invalid, if he should have a paroxysm of fever or augmented heat and irritation at this time, and if also he has taken a light and early dinner. We have the evidence of Horace, that in his time inunction and bathing in cold water were used as means of procuring sound sleep :

“ *Ter uncti*

Transnanto Tyberim, somno quibus opus est alto.”

To determine how long it is proper to continue in the water requires that we should take into consideration the habits of the invalid, his disease, and the rise or decrease of the febrile or morbid irritation under which he may labour. When there are doubts about reaction, or the excitement of the system is little, if

any above the natural standard, he is to be satisfied with a single immersion or plunge, and then to leave the water, and after well drying and rubbing the skin to resume the usual habiliments. Buchan says that he has had repeatedly occasion to remark, that the same person by returning into the water several times has at length become so enfeebled, as with difficulty to be able to regain the machine; and has continued to be affected with headache, chilliness, and general lassitude during the remainder of the day.

The remaining for a moderate space of time completely immersed in water is not attended by such debilitating effects; and hence at least one advantage of the system so general at our watering places to advance into the sea and remain there during the period in which the bath is deemed proper. The very different consequences resulting from the long continued immersion in the sea, and from being alternately covered with water and exposed to the air, are strongly exemplified in Dr Currie's interesting narrative of the effects of a shipwreck on some mariners, who were cast away on a sand bank that lies at the mouth of the river Mersey. Two captains, one the master of the vessel, were on the upper part of the wreck, and completely out of the water, only subjected to occasional wettings from the sea dashing over them, and from showers of sleet and snow. They both perished. Those who were in good part, or almost entirely immersed in the sea up to their heads for twenty-three hours, survived, and were taken off by a boat, except one of their number, the cook, a weakly person, who died on the wreck.

Dr Currie has ascertained by direct experiments, that the pulse and animal heat, lessened in a cold salt

water bath, were still farther depressed after the person had come out of the water and remained for a few minutes exposed to the air. Similar effects have been already pointed out as occurring after immersion in the common cold bath. But a circumstance also worthy of being mentioned is, that the greatest loss of animal heat, during the stay in the bath, was experienced about two minutes after immersion. The thermometer in the mouth continued to rise from this time until the expiration of ten to twelve and sixteen minutes, though it was still lower than before immersion.

In confirmation of the greater advantages to be derived from remaining in the water for a limited period than from repeated immersions, we are told of the guides at bathing places, who continue often for hours together in the water, without sustaining any material injury. Buchan says that he has frequently remarked the reaction to be more powerful, and the glow on the surface of the body more vivid after remaining under water for about a minute than when the immersion was only instantaneous.

Knowing the refrigerating effects of exposure of the naked body to the air, after coming out of the bath, we cannot be too solicitous in recommending a speedy resumption of the customary clothing. A great part of the unpleasant sensations experienced by bathers, during their dressing, may be obviated by the easy expedient of enfolding the whole body, immediately on emerging from the water, in a dry and ample flannel wrapper. The flannel readily absorbs whatever superfluous moisture may remain adhering to the surface, and thus supersedes the tedious process

of wiping the skin; while, at the same time, it completely prevents all loss of heat by evaporation, or by the successive contact of fresh portions of cold air.

A scrupulous attention to wiping the surface of the body perfectly dry, after leaving the bath, is less requisite than is commonly imagined. To remove the superfluous moisture adhering to the surface of the body, which might render the linen damp, is quite sufficient. Speedily to resume the usual vestments, which is incompatible with sedulous wiping, is comparatively of much more importance.* In cases, however, in which the skin is very sensitive and prone to temporary eruptions or excoriations, it is desirable to wipe the surface dry, so as to prevent the deposition of saline particles, and the consequent stimulation which they would produce.

A few words will be in place here, respecting the practices advisable after bathing. A moderate walk or ride serves to promote the reaction after coming out of the bath, and to equalize the circulation; but the exercise should not in either case be prolonged so as to introduce any degree of sensible perspiration, still less of lassitude.

If a person has used the bath at an improper time, or in too feeble a state of body to experience any reaction after coming out, but on the contrary remains for some time cold and shivering, we ought immediately to direct removal to a warm bed—frictions over the skin generally, and especially the chest and extremities; and, what is the most efficacious remedy of all, a bladder filled with hot water and applied to the

* Buchan.

pit of the stomach. Unless under the circumstances just indicated, the practice of going to bed after bathing is not to be recommended.

With many persons who have bathed, it is a necessary condition for the recovery of their natural temperature and frequency of pulse, after morning bathing, that they should take breakfast. Should they who bathe towards noon feel chilly afterwards, they will experience a similar benefit from taking a basin of soup, or a warm infusion of lemon peel, ginger, or mace, or even of an aromatic herb; any of which will be found, at least, equally efficacious as a cordial disguised in the form of a drug. By similar means we may remove the headache experienced, after bathing, by delicate persons, especially females. The pain is generally seated in the external, or the back part of the head, which feels cold. This complaint has been compared to the headache in hysteria, or which accompanies the cold fit of an ague, as well as that which occurs the day after inebriation, and appears to be the result of a general torpor of the system, produced by the coldness of the bath. In general it may, we are told, be obviated by covering the head with a warm woollen cap immediately after bathing.

Curative Effects of Sea Bathing.—"Bathing in the sea," says Buchan, "has been found to be most generally useful in complaints arising from diminished energy of the vital functions, and distinguished by symptoms of languor and debility." We have in these few words the prevalent creed of those who have written on the use of sea bathing. I reproduce them on the present occasion in order to be furnished with an opportunity of making a few remarks on the ideas which we ought to attach to the words languor,

and debility or weakness. This feeling is experienced under two different states of the system at large, or of particular organs. Thus when a customary stimulus is withheld, as of light from the eye or food from the stomach, each of these organs is enfeebled; the feebleness of the stomach, as in prolonged hunger, is participated in by the rest of the body, and the individual is disinclined and unfitted for any muscular exercise. When, on the other hand, the eye is inflamed by continued exercise in an imperfect or excessive light, it is red and engorged with blood—it is also weak and unable to perform its visual functions, or tolerate common day light: when the stomach has been gorged with much and stimulating food, there is a sense of general oppression, disinclination to motion, and weakness, as it is called. Repeated indulgence in high seasoned food and fermented liquors will ultimately excite a chronic irritation of the stomach, accompanied by nearly continual thirst, dry and parched skin, pains in the head, joints, and limbs, and feebleness of the parts, as well as of all the senses. A person suffering from fever, with heart beating violently, temples throbbing, skin burning, and continued restlessness, is weak—he cannot walk without tottering. Debility or weakness, therefore, merely implies an inability in an organ or organs to perform their customary functions,—owing to their suffering either from forced and protracted repose and absence of their appropriate stimuli, or from hurried action and an undue amount of those stimuli and their protracted application. To make use of a still more familiar illustration, we may take the case of a man whose lower limb has been confined for some weeks, in a horizontal position, by splints and bandages. After these are

removed, and he is allowed to use his limb, and desired to stand and walk, he will declare that he cannot, it is so weak and stiff. Suppose this man to have recovered entirely from this state, and to be able to walk, jump, and run, with his accustomed freedom, and that, while engaged in some one of these exercises, he sprains his ancle. In the course of a few hours the joint is swelled, red, and painful. If asked to walk, he makes nearly the same reply as in the case of his confined leg—he cannot on account of the weakness and stiffness of the part.

If medical advice is solicited in these two instances, the desire expressed in both will probably be, to have something done by which the affected limb shall be strengthened. But how different the means by which the desired result is to be obtained. In the first, the doctor will take hold of the limb, and move it in various directions, bend it at the joints, or, if these are too rigid, he endeavours, by frequent efforts, to move them a little: he directs friction of the limb, and hot water to be poured over it. In fine, his aim is to exercise and stimulate it, in order to restore it to its customary strength.

In the case of the sprained limb, he proceeds in a very different manner; he recommends rest—if the pain and heat be considerable, he has blood drawn from the part by leeches—and afterwards orders cold applications, by cloths wrung out of cold water, or this fluid poured on the part. And whereas in the first mentioned case, of the limb stiff from confinement, the stomach being sound, nutritive food is liberally allowed; in the present one, even though there should be no disease of the stomach, it is prudent to lessen the quantity of food, to use cooling drinks, in

order to prevent the feverish disturbance which might arise, or to abate it if arisen from the sprained ankle. Under these opposite modes of treatment, the same desired result is obtained, viz: recovered use and strength of the limb. Even supposing in the instance of the sprain, that a disappearance of the heat, redness, and pain is not promptly followed by a complete reduction of the swelling, and ability to move the joint, we at least put it in the state most favourable for such motions, and then trust to time for entire restoration. In proportion, also, as it is assimilated to the condition of the limb, stiff and weak from long rest, will it bear a treatment similar to that adopted for the latter, such as frictions and hot douching.

Now the reader, whether learned or unlearned, will be tolerably safe in receiving the case of a sprained joint as analogous to and exemplifying a large majority of the diseases of the different organs of the animal structure. For one case of weakness and torpor, the direct result of inaction and deficient stimulation, there will be found fifty of weakness caused by inordinate or irregular action and excessive amount or intensity of stimulation.

In acute diseases the violence done to the structure of the part, whether brain, lungs, stomach, liver, or skin, is such as to threaten disorganization, and to require prompt and decisive means of relief—among which, as we have already seen, the external and internal use of cold water merits a conspicuous place. In chronical maladies, that is, diseases of duration, not immediately threatening life, or requiring confinement to the house, nor preventing the invalid from transacting many of his customary affairs, the

strain of the organ or organs is less violent, and calls for less energetic means of relief. The great object is to abate the still persistent excitement of the organ, which is indicated by pain, heat, and sympathetic disturbances of other parts, and which amounts often to daily returns of fever. To accomplish this, we treat it as a strained part—we give it rest—not the positive rest of a sprained joint, that is generally impossible, but the comparative rest which consists in withholding all unnecessary stimuli or irritants—such as would accelerate its movements by determining an increased amount of blood to it, and exalt its sensibility. Among the means best calculated to accomplish this purpose, is the sedative and tranquilizing agency of water, at a temperature which may be chosen from a little above freezing point to a few degrees below blood heat. The selection of temperature will be made with a reference to the actual excitement of the part affected, or, as we may say, without error, strained, and to the activity of the sympathetic excitement of the heart, blood vessels, and skin, constituting febrile heat, together with thirst, restlessness, and disinclination to active movements.

Weakness and languor thus understood, and we must solicit the reader never to forget that this is the correct understanding of these feelings and states in the large majority of cases, may still, as heretofore, be spoken of as being benefited by sea bathing. Immersion of the body in the water of the sea, on a summer day, will produce nearly the same effects on a person who complains of weakness and discomfort, owing to the chronic irritation of an organ in which the others sympathise, as immersion in water rather cool, or approaching to a tepid state, would on a

sprained joint, in its second stage of irritation—pain, heat, and swelling still remaining, but less than at first. We cannot, it is true, apply the water of a cold bath or of the sea directly to the suffering organ; but we can apply it freely to that surface, the skin, with which the organ so regularly sympathises, to which it communicates its own morbid impressions in the first instance, and from which it may by our efforts receive healthy or curative impressions subsequently.

English writers love to descant on the excellent effects of sea and cold bathing in general, in *scrofula*. Whatever feelings of weakness may be experienced in the progress of this malady, it is not the less certain that it is associated with no little irritability of the functions, both of the senses and the brain, and of the internal organs for nutrition. There is inequality of temperature, and frequent accessions of heat and flushing—thirst and disturbed digestion—often daily slight but evident paroxysms of fever. Though the more hideous forms of *scrofula*, in ulcers on various parts of the body, especially the neck, and distortions and swellings of the joints, with purulent inflammation of the eyes, are not near so frequently met with in the United States as in Great Britain, yet we are far from enjoying that entire exemption, which over zealous patriotism has led some to assert. In young persons the common symptoms of a scrofulous habit of body are, swellings of the glands or little round bodies on each side of the neck, thick lips, weak vision, and often redness and soreness of the borders of the eyelids: the appetite is also irregular, being at times voracious, at others wanting—the breath is hot and often offensive—sleep disturbed, and to the anxious mother, her suspicions still farther excited by

some good old nurse, her child seems to suffer from worms. The chief causes of scrofula operating on inherited predisposition are cold, damp, impure air; food in excess or of deficient nutrimental properties, in either case irritating the stomach and digestive organs; and imperfect clothing.

Persons predisposed to, or labouring under this disease are excited and excitable; but they are also easily depressed in the exercise of their corporeal functions. Cold increases the torpor of the glands, and renders them more liable to subsequent engorgement and inflammation. Heat stimulates and causes febrile disturbance. The desideratum then in persons of a scrofulous habit, is to keep down irritation by avoiding any excess, whether of nutritive or other stimuli, and at the same time to adopt such measures as shall procure healthy digestion, and the due changes of blood in the lungs, which in such persons are prone to take on disease, ending finally in consumption. With this view, simple food, pure air and regular exercise are to be especially insisted on. In aid of these means we have recourse with benefit to cold or tepid bathing, according to the excitement of the system and the extent and readiness of reaction. Sea bathing for the reasons already given is a less equivocal remedy in scrofula than the simple cold bath—and has accordingly been used with very marked advantage in this disease; it abates the undue heat and dryness of the skin and the excitement of the vessels, especially of those minute capillaries, the morbid action of which so conspicuously keeps up the diseases of the glands, and other parts of the animal economy.

We must, in our preventive and curative direc-

tions for scrofula, constantly bear in mind, that however efficacious in particular circumstances sea bathing and sea air may be found, they are not, any more than other remedies, specific. Sometimes the disease is found to prevail very extensively in places of maritime exposure, but which it must be said are low and damp; and so far from benefit accruing to invalids visiting one of these places, such as Lynn is described to be by Dr R. Hamilton, it would be to their interest, to select some spot in the interior, on elevated ground or hills, and the air of which should be pure and dry.

Change is therefore, a great object, and to the inhabitants of a large and crowded city, who spend most of their time in close, ill ventilated apartments, and deprive themselves of adequate exercise, a summer's residence at a well chosen situation on the sea coast, in which the air has free course; and a judicious use of the sea bathing, will greatly contribute to warding off an attack of scrofula, or of moderating and curing it when actually present. But unless due attention be paid to the food, both as regards its simple quality, moderate quantity, and regular intervals of eating it; and to obtaining the due proportion of sleep within the proper period of the night, disappointment will be too often the fate of those who go to the sea shore, whether to obtain a cure of scrofula, or any other malady whatever.

Benefit is obtained, in cases of swelled glands of the neck, from keeping linen cloths moistened with sea water, constantly applied to the parts. Frequently wetting the lips and nostrils, when these parts are much thickened in scrofulous habits, has also been found serviceable. *Ulcerations of the hairy scalp*

are well treated by first shaving the hair off, and then frequently sponging the diseased surface with tepid sea water. The following judicious observation of Dr Buchan will very appropriately find its place here: "children," says he, "tainted with scrofula, frequently have a profusion of fine hair; though this may be reckoned an ornament, parents who consult the welfare of their offspring should not permit it to remain, for it is commonly observed, that children who have very long hair are in general pale and unhealthy." It is painful to find the cruel vanity of parents, in these, as in some other particulars which might be named, making them regardless of the urgent remonstrances of a physician, and the obvious injury to the health of their children. Their hearts are gladdened by the sight of curling hair, and flowing flaxen tresses—but have they no sympathy for their little darlings, puny and pale faced, with often weak eyes and swellings along the sides of the neck, at times the direct consequence of the hair being allowed to grow long.

In *scrofulous affections* of the joints accompanied with ulcerations outwardly, salt or sea water has always been a favourite local application. To heal the ulcers, even though ankylosis or immovable joint result, is a far preferable course to amputation, which in cases of decided scrofulous diathesis is of very equivocal if not injurious tendency.

In all these varieties of scrofula, as well as in marasmus or wasting away of the body, with slow fever and imperfect digestion, the internal use of the sea water has been much extolled. On this point I can speak with more propriety, when treating professedly of mineral waters.

Dyspepsia, *hypochondriasis*, and their numerous associated ailments, such as *sick head-ache*, and *palpitation of the heart*, to which we vaguely apply the epithet nervous, are benefited by sea bathing, when they have been mainly the effect of deficient exercise, late hours and close atmosphere, and are accompanied by a hot and dry skin, and frequent pulse, or at least by daily paroxysms of this nature. We must be less sanguine of success when they are kept up by chronic inflammation of the stomach or liver, and are the complaints of persons advanced in life, whose constitutions have been broken down by early excesses. In any case a regulated regimen must be insisted on.

Hysteria and *chlorosis* occurring from nearly similar causes as the above, but producing effects modified by the peculiarities of female organization are not unfrequently removed by a visit to the sea shore.

Breathing in purer air than customary, additional exercise, and pleasurable mental excitement, must in such cases, come in for a large share of the cures attributed to sea bathing. But, if ladies fair, of whatever age or degree, wish to obtain relief from their maladies, call them what we may—nervousness or weakness, or hysteria, or direct obstruction of a function, the regularity of which is so necessary for their health; and if they pant for a return of good looks and good spirits, the real talisman, they must shun the crowded evening assembly, or the mazes of the tempting dance, or the indulgence of an occasionally wayward appetite, in just tasting this relish, or that paté, or sipping coffee or tea. As to cordials, whether we call them liqueurs, or porter or wine—they are happily becoming such unfashionable beve-

rages that it is less necessary than heretofore to caution against their use. Medical theory and experience, sound sense, and popular observation, are at last in this respect coincident with and supporters of feminine delicacy.

Females with cold skins and phlegmatic habit, or exhausted by prior disease, and who are clear of fever, will only be injured by sea or cold bathing.

“Epilepsy when it occurs before the time of puberty, has been cured by sea bathing.” It is possible, that any remedy persevered in until this epoch of life, would obtain similar credit, for that which is often due to a natural change of the relative vigour and new sympathies of the functions of the animal economy.

Chorea, or St Vitus's Dance, has been often cured by sea bathing, with which in some cases has been conjoined the internal use of sea water.

In the *second stage of hooping cough*, a visit to the sea shore, and recourse to daily exercise and bathing have produced the very best effects.

Asthma of a purely nervous kind is said not to be benefited by sea bathing; in other, and we may presume more frequent varieties of this disease, kept up by congestion of the pulmonary mucous membrane, and of a chronic nature, with a somewhat increased action of the pulse, sea bathing and sea air have given speedy and marked relief. But even these remedies will not be antidotes against the effects of indulgence of crapulous propensities by eating heavy meals of gross food, and especially shell fish, such as lobsters; or of neglecting suitable clothing.

Aphonia, or loss of voice, has been completely removed by sea and cold bathing. There are two

kinds of aphonia, or rather the loss of voice will proceed from two causes; one evidently nervous, another the effect of minute ulcerations and a relaxation of the palate and uvula, in which the larynx is also implicated. In the first, the voice will be lost sometimes in the evening, and be restored next morning—at times, this effect is owing to certain odorous emanations as of musk; it has been removed by a cold bath. The second, sometimes erroneously treated as a syphilitic affection, by administering mercury, and greatly aggravated by this means, has been cured by sea bathing. Odier relates a case of this nature, in which after the failure of a great variety of remedies, relief was obtained by frictions every morning, over the whole body with ice and flannel alternately.

In the *febricula*, or slow fever, to which persons of a sedentary life are so subject, sea bathing displays the same beneficial effects attributed to the cold bath, in the preceding chapter, p. 113, 114. The fresh air of the shore, and freedom from the harassing cares of business or study, during the temporary absence from home, contribute largely to the relief obtained by bathing. What was said, also, of the cold bath, as affording protection against frequent returns of catarrh and rheumatism, will apply still more forcibly to sea bathing. The success of Antonius Musa, in curing Augustus Cæsar of a protracted catarrhal affection by these means, gave uncommon vogue to the cold bath among the Romans. As a mere variety in their luxurious life—something to renew their exhausted sensibilities and help them to pass off time, we cannot doubt that the wealthy patricians, whose edifices surrounded in a manner the bays of Baia and Cuma, and Naples, would indulge in the practice

of sea bathing, even without the fashion being set by the Emperor, or its efficacy proclaimed by a celebrated physician. At the present day, the Neapolitans of all classes indulge in sea bathing—from the young amphibious lazzaroni, who spend half their days paddling and swimming in the water, to the fat and brown titled dames, who drive down to the shore in their carriages, and who, when there, do not turn away their heads from the nude figures just mentioned, desporting themselves outside the baths. Indeed, the whole beach swarms so with these urchins, that a cautious man without putting down his knife and fork may, while dining in one of the houses, which open on the harbour, take lessons gratis on swimming, and sundry other marine gymnastic exercises.

At the very time, however, when the cold bath was thus made fashionable in Rome, there occurred a remarkable and melancholy instance of its fatal effects in the practice of this very Musa, to whom the golden ring of the equestrian order, and a statue in the temple of Esculapius, had been decreed for the cure of his imperial patient Augustus. The case referred to is that of young Marcellus, whose delicate frame could illy bear that shock and sedation from cold, which had been so serviceable in the complaint of a hardy soldier. Marcellus was not, as some have supposed, immediately destroyed by the cold bath; but it prostrated him to such a degree, that he died soon after at the hot springs of Baia, whither he had been sent, in hopes that they would counteract the bad effects of the former practice*.

The great object in the prevention and cure of

* Biancone, *Lettere Celsiane*.

rheumatic, not less than of catarrhal complaints is to equalize the action of the skin in such a manner, that it shall not sweat on the slightest exertion, nor have such morbid susceptibility as to be affected by every change of weather. Sea bathing contributes very much to so desirable an end, by diminishing the excitement of this surface, thereby lessening the frequency of perspirations, and by giving a habit of bearing sudden vicissitudes of temperature. In cases of rheumatism, where the skin is habitually cold and torpid, it will be proper to premise a short course of warm bathing, frictions of the skin, and as much exercise as the infirmity of limbs will admit of.

A variety of chronic catarrh, which displays itself in a troublesome flow of mucus from the nostrils and often continues for months, is cured by immersion of the head in cold water, or by the application of this fluid to the part, by means of a spout or tube. The following case from an old writer little known (*Vander Heyden*) will serve to confirm this assertion.

“Bathing of the head in cold water cures also inveterate pains of that part, and the continual catarrhs and defluxions from thence. For it is certain, that if the head be put in cold water, as far as the middle bone of the hinder part of the head, and to the end of the nose before, so that there be left just so much of the nose out of the water, as that the party may have freedom of breathing only, and that this be done so long, as while a man may be saying the Lord’s Prayer, the pain of the head, though it hath been of long continuance, will hereby be removed, and the defluxions stopped, as hath often been proved by experience. And I have been much confirmed in this opinion of mine by an experiment of it made upon a certain

English Knight, named Sir Toby Mathews, a man no less eminent for wisdom, than fit for public trust. This gentleman having been troubled twenty years together with an intolerable pain on one side of his head, and also with a continual and violent defluxion of the head, distilling through his palate and nose in so great a quantity, that he could never go without a wet handkerchief in his pocket; he was so happily cured of both these maladies in the sixtieth year of his age, by thus bathing his head in cold water; as that till the seventieth year of the same which he hath now passed, he hath never had the least touch of either during the said space of time; and being now better in health than ever he was in his life before, to prevent his falling into the like infirmities again, he useth the said immersion of his head in *cold water* all the year long, and even in the depth of winter; also, he saith that he received this profitable advice from a certain English Nobleman, who having himself been a long time much tormented, with the same disease, had by this means cured both himself, and very many others who were alike affected, and restored them to perfect health to the great admiration of all men."

The local application of salt and water, or of sea water, has in some instances completely succeeded in removing that species of encysted tumour termed a *wen*. A remarkable and well authenticated case is detailed by a respectable gentleman on whose person it took place, and who published a succinct account of it in the Gentleman's Magazine. His practice consisted in bathing the surface of the wen ten or twelve times daily, with a strong solution of salt in water. On the eleventh day from the first applica-

tion, while shaving, he observed a small discharge; which assisting by gentle pressure, the whole contents were soon emptied without the smallest pain, and without loss of blood. Buchan, who gives these details, states his having himself seen a wen, situated between the corner of the jaw and the ear, being removed by the application of water impregnated with salt. The discharge of the contents of the tumour, which exuded through several small apertures contiguous to each other, did not take place till the application had been regularly persisted in for more than three weeks.

After having indicated the diseases in which sea bathing will, with suitable precautions, be found serviceable, it is fit that I should state circumstances of bodily infirmity in which the practice is hazardous if not directly injurious. In inflammation of internal organs, as of the lungs, liver or digestive canal, marked by pain and regular daily returns of fever with a somewhat active and tense pulse, sea bathing is inadmissible—not that in its immediate effects it is so prejudicial, but in the reaction of the suffering organ, consequent on that of the skin, there is an increase of the phenomena of vascular injection, and fulness and pain. The sentient and other surfaces will not bear that permanent depression, which a very long continuance in the water would produce, and which would be required to notably diminish the morbid action of the part beyond the condition for vigorous reaction. In addition to this reason, why sea bathing should injure in incipient consumption and hæmoptysis, is that other one assigned and explained, when I spoke of the effects of swimming. In all cases in which there is undue determination, or sense of fulness in a particular organ, sea bathing ought to be postponed

until the removal of this condition by general or local bleeding, and suitable aperient medicines.

Diseases of the skin of an acute or sub-acute character, are often aggravated by sea water—hence, in acute herpetic eruptions, and scorbutic sores, and erysipelatosus affections, this remedy is not admissible. In those on the other hand of a chronic character, with dry scurfy skin, sea bathing will give great relief, and with suitable regimen contribute largely to a cure. When we have doubts of the propriety of the application, on account of the subsequent heat, and irritation of the parts—these may be obviated by washing the skin with simple tepid water after coming out from the sea. Buchan considers sea bathing as prejudicial in most ulcers, those of the legs as well as scrofulous ones. But we shall be more correct in admitting that, although washing parts so affected in sea water generally increases the discharge, and not unfrequently the pain; yet in old and indolent ulcers, this very irritation induces an action of the parts which disposes them to heal more readily than before recourse was had to the saline applications. Russel, in his *Œconomy of Nature*, relates cases in which marine bathing and lotions of salt water, or compresses wet with this fluid, to the sores, were followed by the best effects, in strumous swellings of the nose and lip—ulcers in various parts of the body, and sometimes scrofulous ulceration of the borders of the eyelids, and œzena or purulent discharges from the nose. After pursuing this practice for a while, it should be desisted from, and the sores merely wet with simple water, or that slightly saline, and sea water with mild laxatives taken internally.

Females during a course of sea bathing often have

swelling of the lower extremities, which soon subsides by using a few warm baths—a practice first recommended by Darwin, and subsequently insisted on more at length by Reid.

Diseases passing under the indefinite term of *bilious*, which are generally associated with indigestion, daily fever, some discoloration of the skin, or of the white of the eye, and a furred tongue, are not those in which sea or cold bathing displays good effects. As this morbid state is usually the result of habitual indulgence in rich and high-seasoned food, combined with the stimulant effects of fermented and perhaps of spirituous potations, it can only be removed by temperance, exercise, and duly regulated evacuations. The sedative impression of cold on the skin, transmitted to the stomach and liver, the viscera chiefly in fault—is succeeded by reaction, which is necessarily irregular in these organs, owing to the unequal circulation and distribution of blood in them at the time. Besides, the skin, though often dry, and in the daily paroxysm hot, has at other times a soft and clammy feeling, which is not the condition most favourable for cold or sea bathing.

But if this practice be inadmissible, it by no means follows, that visiting the sea shore should be injurious to the dyspeptic and the bilious. On the contrary, the most marked benefit often follows such a change, when tried as well by this description of persons as by those slowly convalescent from remittent and intermittent fever. This remark applies in a more peculiar manner to those who live in low, marshy, or ill-ventilated districts of country—and who are either prone to be attacked by intermittent fevers, or are actually suffering from them; or, finally, who are just recover-

ing from them, but at the same time in perpetual fear of a relapse. To all such, young and old, I would freely recommend a residence, during a part of the summer, at the sea shore. They will, it is true, be liable to have a chill, the first easterly wind that blows, especially should rain accompany it, unless they be exceedingly careful to use warm clothing at the time; but the risk of such returns will become daily less and less, and a few doses of quinia will place the invalid in a state of composure and exemption from disease, which ten times the quantity would have failed to do at home.

Should a person be attacked by a paroxysm of intermittent fever at the shore—he can with great safety and propriety avail of the use of immersion in sea water, or affusion of this fluid over the body during the hot stage. Except at this particular juncture it is not advisable for an invalid to be in any great haste to bathe for some days after his arrival, and until he begins to experience the invigorating effects of sea air and moderate exercise, and discovers that the simple food, which he is presumed to use, is digested and goes regularly to his nourishment. Then, selecting the time when there is a slight febrile exacerbation, he may bathe with advantage, and be subjected to less restraint in the quality and quantity of nutritious aliment than before. By this I mean to say, that the slight fever and the heat of the palms of the hands and soles of the feet, and thirst, from which convalescents frequently suffer, even when they are gaining flesh and strength, will be moderately abated by sea bathing, and the undue feebleness from prior excitement will thus be prevented.

It has been recommended, as a substitute for sea

bathing, when it is not in a person's power to visit the sea shore, that the following simple process be adopted: to rub the skin till it glows with a coarse towel wrung out of salt water, and rendered nearly, but not quite dry by exposure to the rays of the sun; or, after bathing in spring or river water, to wipe the body with towels, which have been wet with water in which a considerable portion of common salt had been dissolved, and then dried.

Even when at the sea shore, they who are so delicately constituted as not to be able to bear the shock of immersion, may well have recourse to the practice of rubbing the surface with a sponge previously immersed in sea water, and afterwards pretty active friction with a dry coarse towel. I may here refer the reader to what has been already said respecting the topical or partial application of cold water by sponging, as a guide for his conduct in the use of sea water in the same way, and from which nearly the like results will be obtained as in the former case.

A share, and that no inconsiderable one, of the benefits which are derived from a visit to the sea shore, or any watering place, and which are often attributed to sea bathing, ought to be referred to change of scene and occupation, by which the mind is agreeably occupied, and the nervous system no longer harassed by cares and excitements, which deteriorate all the important functions of digestion, respiration, circulation and secretion. This position admitted, and few will dispute it, since every individual has more or less personal experience of its correctness, it follows necessarily, that to obtain, or rather not to neutralize, all the good effects from the change, the plain precepts of hygiene, which inculcate regular meals and

sleep, and avoidance of all undue excitement, whether from the bottle, the gaming table, or the ball room, or from heedless indulgence in ill nature, peevishness or anger, must be adhered to. Society is not to be shunned by the invalid, but he or she, as the case may be, ought to shun that kind of company or assemblage in which uncomfortable exertions by minute attention to the toilette, and the frivolities of fashion are required, or in which innumerable little incidents are occurring, calculated to excite or depress that ever active principle of our nature, vanity. It is not in our power always to enjoy the pleasures of friendship, or of social intercourse sustained by community of tastes and feelings, but if deprived of positive pleasures, we need not invite on ourselves positive annoyances, by encouraging the intrusions of those from whom we derive no instruction, nor any useful or ennobling example. Still less ought we to display the weakness of seeking the society of such people; and thus subjecting ourselves to a kind of slavery as annoying to the mind as injurious to health. If free agency be at any time desirable, it is especially so for an invalid abroad, who ought to keep himself clear of all the chains of bad habits, and the entanglements of idle, frivolous or dissolute company. At home, in the bosom of his family, or surrounded by affectionate friends, he is less exposed to danger from these causes.

Aware of the sudden vicissitudes of temperature in our climate, even in the midst of summer, and of the peculiar force with which they are felt on the sea shore, persons visiting it ought, to always provide themselves with thick cotton and woollen garments, to be put on when there is a sudden fall of the thermometer, and change of wind from a westerly to an

easterly direction. Days will occur even in July and August, at the sea shore, which are as cold and inclement, and require the body to be as much protected, as in the last of October or the beginning of March. Precautions of this nature are more particularly necessary to those persons who are subject to catarrhs, rheumatism, or bowel complaints.

They, whose chests are weak, who have a dry tickling cough, or who occasionally complain of pain in the breast, or are subject to slight discharges of blood by coughing, ought to avoid our sea shore, that is a line of coast, exposed to the easterly wind, which universal experience shows to be so eminently hurtful all over the world, to persons either predisposed to consumption or labouring under this disease. The apparent exceptions to this rule are readily explained. It not unfrequently happens that they who have laboured for some time under chronic irritation of the stomach or liver, are at the same time harassed with cough, which is here purely sympathetic of disturbance of another organ and not of the lungs. A removal of the primary disease in such cases very generally is sufficient for the cure of the cough, if it have not lasted so long that the structure of the lungs themselves is impaired. An attentive observation of the symptoms will enable a discerning physician to determine between a primary, and a *gastric* or secondary cough, and shape his directions as to change of climate, regimen, &c. accordingly.

Exercises of various kinds ought to be had recourse to by the invalid according to his strength, and the facility of indulging in them. Walking and riding, and boat sailing are among the chief of these. The view of the sea, and, still more, committing ourselves on its bosom in a boat, are well calculated to impress

the mind with blended feelings of admiration and awe, and give it an expansion well adapted to destroy the little petty feelings of vexatious hypochondriacism and nervousness.

The following remarks of Buchan are so applicable to many persons in our own climate, that I shall transcribe them without comment. "There is a peculiar species of catarrhal affection which attacks many people, especially those who reside in great towns, towards the latter end of summer. This complaint is characterised by an increased secretion of the mucus in the bronchiæ, which the patient is perpetually endeavouring to bring up by a short hacking cough. This being a voluntary effort, it rarely occurs during the night. The pulse is quick and feeble, and the body becomes emaciated. This disease, which may be termed a chronic catarrh, appears to be the consequence of the heat of summer relaxing the vessels diffused over the internal surface of the lungs, so that they pour forth the fluids secreted by them in augmented quantity. Having myself experienced repeated attacks of this complaint, I may be permitted to state, that for my own case I could never discover any remedy but a change of air; and have generally found that, after having breathed the air of the sea for twenty-four hours, the cough has not even once recurred. And I can add with truth, that I have occasionally recommended the same plan to many others in a similar situation with equally salutary effects."

Writers, who have written on the employment of sea bathing in disease, also speak of the effects of drinking sea water at the same time. I shall defer treating of this point until I take up the consideration of mineral waters.

CHAPTER VI.

Limits of the warm bath.—The tepid bath—its fitness for general use, to preserve personal cleanliness.—Propriety of having public baths, in imitation of the Romans.—Tepid bathing ought to be a part of domestic hygiene—connexion between cleanliness of body and purity of mind, and between both and beauty—females not attentive enough to this principle—writers of the sex quoted, who urge the frequent use of the bath.—General effects of tepid bathing—safe and serviceable to persons in health—and refreshing to those who are labouring under unusual excitement—is less sedative than the cold bath; and hence better adapted than this last to the advanced stages of fever.—Misconceptions and prejudices respecting the nature and effects of the warm bath.—Opinion of the ancients clearly expressed in their dedicating warm springs to Hercules—Homer's sentiments quoted—practice of the athletes.—Cause of the disrepute into which warm bathing fell among the degenerate Romans.—The hot in later times confounded with the warm bath.—Bacon and others eulogize the warm bath, as useful in warding off the approach of old age.—Opinions of the relaxing and heating effects of

warm bathing confuted.—This kind of bath diminishes the frequency of the pulse and of respiration—necessity of attending to posture in experiments of this kind—increase of absorption and exhalation during immersion in the warm bath.—This remedy is soothing and sedative—and disposes to sleep—it acts on the capillary and nervous system primarily—by removing irritation it seems to have a tonic effect—is especially serviceable after fatiguing bodily exercise.—The warm bath is a good remedy in morbid sensibility—mania—convulsions—colic—cholera morbus and cholera infantum—dysentery—diarrhœa—croup—catarrh, incipient and chronic—pulmonary consumption—bronchitis—asthma—organic affections of the heart—inflammations of the liver, especially of the chronic kind, and of the kidney—catarrh of the bladder—amenorrhœa—diseases of the skin—fevers, in the forming and in the advanced stages of—and in the chill of intermittents—in eruptive fevers—rheumatism and gout—mercurial disease—paralysis.—The warm bath is employed by surgeons for the reduction of hernia, and of dislocations.—Time for using the warm bath is on an empty stomach, and after fatiguing exercise.—Greek and Roman practice.—Count Rumford's personal experience.—Duration of the warm bath.—The fashion of bathing at various thermal springs in Europe.—Arrangements for poor invalids at these springs.

THE limits which I have assigned to the warm bath are, as already stated (chap. iii.), 92 and 98 degrees

of Fahrenheit; the mean between which will be 95°. On immersion in water at this last degree, it is believed that a large majority of our species will experience a decided, yet pleasurable sensation of warmth; and obtain the good effects, most generally attributed to this kind of bath. An approach to the upper, or that of 98 degrees limit, will be most grateful to those persons who habitually, or from accidental circumstances, have a skin possessed of little activity, coldness of the hands and feet, and slow circulation—while the lower limit, or that at 92 degrees, will be preferred by the sanguine and plethoric with active circulation and hot skin. Between 92 and 85 degrees will be the range of that uncertain kind of temperature usually designated by the term tepid or milk warm. I say uncertain in reference to the sensations produced by immersion in it. Imparting less luxurious enjoyment, and not so susceptible of use in doubtful cases, such as in disease, and after extraordinary or exhausting bodily exertions, the tepid bath is, notwithstanding, that variety which is the best suited, as a means of public hygiene, for general bathing, and ablution and purification.

In ages which we are accustomed to speak of as barbarous compared with our own, large public baths were erected in the chief cities and towns of the continent of Europe, for the use of the poor people: “every Sunday evening people formerly went in procession through the streets, beating on basins, to remind the lower classes of bathing; and the tradesman, who laboured at dirty work, washed off, in the bath, that dirt, which now adheres to him during his whole life.”* In the first chapter of this work when

* Hufeland on “The Art of Prolonging Human Life.”

giving a historical sketch of bathing among different people, I mentioned the immense extent and great number of the public baths at Rome, and of the extreme cheapness with which they could be resorted to and used by the citizens. We might with great propriety, in our own republic, take a hint from the Romans, and require our public authorities to make some provision for the benefit of the people, by erecting suitable bathing establishments, the admission to which, if not entirely gratuitous, ought to be at so low a price, that every inhabitant could have it in his power to visit them. Taxes are levied for purposes less useful than this, and surely if we have a board of health in our cities, the duties of which are to guard us against contagion, either imported or domestic, and to the removal of nuisances which would give rise to disease, it ought to be made a part of their duty to protect the citizens against the bad effects of personal uncleanness and the numerous ailments which grow out of it. If their jurisdiction be already thought too extensive, or their duties too burdensome, officers might be easily appointed by the court for each ward in a city, to watch over the baths, regulate their temperature, the hours of bathing, the period for each person to remain in the bath—and to see that they were preserved clean, and, in the intervals between bathing, freely ventilated. What constituted part of the duty of one of the chief officers in the Roman republic, would hardly be thought unworthy the attention of many of our plain citizens.

As a part of domestic hygiene, tepid bathing ought never to be overlooked. A bath house should be deemed in importance only secondary to a kitchen, or a cooking stove, and certainly take the precedence of rooms

filled with costly furniture and devoted to company keeping. A house thus supplied furnishes its inmates with an opportunity of washing the whole body daily, with cold water, if the circulation be sufficiently active to cause reaction and the salutary phenomena already mentioned, or of using the tepid bath, which will be found generally most congenial to children and delicate females. Other older and invalid members of the family can with facility enjoy the luxury of the warm bath, and thus all, according to constitution and habit, will have an opportunity of daily practising a usage which is instrumental to health, adds to comfort, and is essentially necessary for the preservation of personal beauty and vivacity of movement.

To wash one's self ought to have a much more extended meaning than people generally attach to the words. It should not consist merely in washing the hands and rubbing a wet towel over the face, and sometimes the neck: the ablution ought to extend over the entire surface, and it is particularly necessary where often least thought of, as at the bends of the limbs, &c. In a tepid bath, with the aid of a little soap and a sponge, or brush, the process may be completely performed—with a feeling of comfort at the moment, and of much pleasure afterwards. Cleanliness of body is in closer connexion with purity of mind than is generally imagined; and both ought to be associated with our ideas of personal beauty and loveliness. The Grecian fiction, of Venus being of "ocean born," is typical of the aid which beauty is expected to derive from frequent ablution and bathing.

Females are not, we fear, adequately impressed

with the full importance of the practice here recommended. They often spend much time at the toilet—great pains and expense are incurred to obtain, select, and arrange the finest materials for dress, and to display colours in the most tasteful contrast—but is that which ought to precede all these arrangements, the tepid or warm bath, regularly used? Is it had recourse to on the morning, after the fatigues and exertions in a ball room, or an excursion of pleasure in carriage or on horseback? Some ladies will say, aye—but I greatly fear they are in so small a number, as to be entitled to be considered exclusives of the first water, even though they may not show off in silks and brocades. In the interests of vanity alone—a desire to appear to the greatest advantage in the eyes of the other sex—a female should rigidly and regularly follow the practice of daily ablution. This is a point properly urged on their attention by writers of their own sex. Among these, Mary Wollstoncraft, in her “Vindication of the Rights of Woman,” says, “Were I to name the graces that ought to adorn beauty, I should instantly exclaim, cleanliness, neatness, and personal reserve. So necessary indeed is that reserve and cleanliness which indolent women too often neglect, that I will venture to affirm that when two or three women live in the same house, the one will be most respected by the male part of the family who reside with them, leaving love entirely out of the question, who pays this kind of habitual attention to her person.”—Elsewhere she says, “In order to preserve health and beauty, I should earnestly recommend frequent ablutions, to dignify my advice that it may not offend the fastidious ear; and by example, girls ought to be

taught to wash and dress alone, without any distinction of rank."*

The means for the preservation of beauty are enumerated by a lady of fashion, as follows: 1. *Temperance*, in a well-timed use of the table, and so moderate a pursuit of pleasure, that joining the crowd in evening amusements shall not frequently recur. 2. *Exercise*, gentle and daily, in the open air. She goes on to speak of the third and last means in the following strain.

"*Cleanliness*, my last recipe (and which is, like the others, applicable to all ages,) is of most powerful efficacy. It maintains the limbs in their pliancy, the skin in its softness, the complexion in its lustre, the eyes in their brightness, the teeth in their purity, and the constitution in its fairest vigour. To promote cleanliness, I can recommend nothing preferable to bathing.

"The frequent use of tepid [warm] baths is not more grateful to the sense, than it is salutary to the health, and to beauty. By such ablution, all accidental corporeal impurities are thrown off; cutaneous obstructions removed; and while the surface of the body is preserved in its original brightness, many threatening disorders are removed or prevented. *

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By such means the women of the East render their skin softer than that of the tenderest babes in this climate, and preserve that health which sedentary confinement would otherwise destroy.

"This delightful and delicate Oriental fashion is now, I am happy to say, prevalent almost all over the con-

* Journal of Health, Article "Personal Cleanliness." Vol. I. p. 323—4.

inent. From the Villas of Italy, the Chateaux of France; from the Castles of Germany, to the Palaces of Muscovy; we may every where find the marble bath under the vaulted portico or the sheltering shade. Every house of every nobleman or gentleman, in every nation under the sun, excepting Britain, possesses one of those genial friends to cleanliness and comfort. The generality of English ladies seem to be ignorant of the use of any bath larger than a wash-hand basin. This is the more extraordinary to me, when I contemplate the changeable temperature of the climate, and consider the corresponding alterations in the bodily feelings of the people. By abruptly checking the secretions, it produces those chronic and cutaneous diseases so peculiar to our nation, and so heavy a cause of complaint.

“This very circumstance renders baths more necessary in England than any where else; for as this is the climate most subject to sudden heats and colds, rains and fogs, tepid immersion is the only sovereign remedy against their usual morbid effects.

“Indeed, so impressed am I with the consequence of their regimen, that I strongly recommend to every lady to make a bath as indispensable an article in her house as a looking-glass.”*

In these remarks on the necessity of preserving cleanliness by frequent and regular ablution, it is not intended that tepid bathing should be regarded as the only means of accomplishing this desirable end, to the exclusion of cold and warm baths, but simply, that in public and domestic hygiene, it is that variety which can be most advantageously used by mankind.

* *Journal of Health*. Vol. II. p. 90—1.

at large, without detriment or danger. A great many persons, in even vigorous health, cannot tolerate the cold bath for the shortest period, still less can they habitually use it with benefit. Even they who have accustomed themselves to it are in danger from the practice, if it be continued after any sudden diminution of vital energy, by whatever cause produced. The tepid bath is for the most part safe and serviceable to persons in health: and is often exceedingly refreshing to those who are excited, and the temperature of whose skin, and the activity of whose pulse are augmented. Less sedative than the cold bath, the one in question is still capable of diminishing the excitement of the functions; while its immediately tranquillizing effects are followed by less marked and violent reaction, than ensue after immersion in cold water. The general resemblance between the cold and tepid bath is such, that in cases of fever with morbid heat of the skin and urgent thirst, but in which from primary feebleness of constitution, or protracted duration of the malady, the functions are so much worn down as to illy bear the powerful sedation of the former, the milder operation of the latter may be obtained with safety and benefit. The same principle guides us in selecting the temperature of aqueous *enemata* as of that of the bath. After the fullness of detail in which I indulged, when treating of the cold bath, it is needless to go over the same ground in the case of the tepid—now that the principle by which we shall be guided in the selection is stated. It will also be readily understood, that where the grade of excitement is very moderate, and powers of reaction weak, even tepid bathing will be followed by too great an abstraction of caloric and feebleness of the system.

Here it is that the *warm bath*, of which I now proceed to speak in a more particular manner, exerts a happy effect.

Much misconception of the nature and effects of the warm bath has long been prevalent among the people at large; and the prejudices, in consequence, growing out of it have been fostered even by a portion of the medical faculty. One main cause of this prevalent error I have already stated to be, the confounding of warm with hot bathing, and assuming, as an effect of the former, the languor following increased excitement, which is no unfrequent result of the latter. The opinion of the ancients on this point was expressed with sufficient clearness in the fact of warm springs and baths being dedicated to Hercules, as indicative of their restorative and invigorating powers. The warm bath is uniformly spoken of by Homer as a means of refreshing the wearied traveller, and of preparing him for the repast and the enjoyment of other rites of hospitality, as we see in his account of the reception of Ulysses at the court of king Alcinous (*Odyssey*, B. VIII.), and in which, after a minute detail of the whole process of heating the water, the poet speaks of the luxurious enjoyment, and the invigorating effects of the warm bath, in the following words:

“ The bath the king ascends;
Where, happy as the gods that range the sky,
He feasted ev’ry sense with ev’ry joy.
He bathes: the damsels, with officious toil,
Shed sweets, shed unguents, in a shower of oil:
Then o’er his limbs a gorgeous robe he spreads,
And to the feast magnificently treads.”

Let us also bear in mind the fact of the athleteæ seeking for refreshment, and renovation of their exhausted strength, in the warm bath.

It was not difficult, however, to understand why this early and distinctly recognized character of the warm bath should have gradually been replaced by a belief in its enervating effects. What was at first resorted to by the Romans for the purposes of cleanliness and refreshment, after the bodily exercises of the palestra, or the intellectual efforts at the forum, was, after a time, regarded as a pretext for indulging in various frivolous amusements in the apartments and courts accessory or contiguous to the bath proper. In this way idleness and its attendant evils were encouraged, and the minds and manners of the people, if not their bodies, were relaxed, by frequenting the warm bath. But there was still another reason why opinion should undergo a change with a change in practice. When the crowds who visited the baths were mainly attracted to them by a desire to pass away time, it may readily be supposed that the stay in the water would be unduly protracted; and still more, the frequency of use, and the length and period of bathing would require an augmented temperature of the water, to procure the same pleasurable sensations which were first obtained from immersion in this fluid of a moderate warmth. The Ediles, part of whose duty it was to regulate this matter, yielded at last, or rather participated in the increasing corruption of manners and morbid craving for excitement among the degenerate Romans. Hence, no longer satisfied with the warm, their usage eventually was to use the hot bath, almost, according to Pliny, at a boiling heat. Nor was this all; utterly neglectful of

exercises and rational recreations by which digestion is accelerated and natural appetite renewed, they adopted, as a means of exciting a desire for food, or at least of creating a languor and a sensation of emptiness which should give a momentary appetite, another modification of bathing, which is erroneously confounded with the use of the warm bath: “the crapulous glutton entered a small chamber which was heated, to as high a degree as the person could possibly endure, by means of lamps, or flues conducted round the walls. The circulation of the blood being greatly accelerated, and the solvent power of the air much increased by this dry heat, a copious flow of perspirable matter ensued, and artificial hunger and thirst succeeded this unnatural mode of depletion, while appetite, thus excited, was gratified by a return to the festive board.” After being apprized of this mode of renewing appetite, one experiences less feeling of astonishment, though undiminished disgust at that other practice of the more luxurious Romans under the Empire, which consisted in taking an emetic in order to enable them to return to the table and gorge themselves once more with a fresh variety of delicacies. It was time for Goths and Vandals to be allowed to issue out from their northern hive and scourge such a people:

In later times, but before the invention and use of the thermometer, the warm bath was often confounded with the hot bath, and was sometimes considered as heating, and sometimes relaxing. The latter idea, in part, if not wholly, originated from the regarding the changes in dead animal membranes, such as skin and parchment, produced by immersion in warm water, as analogous and similar to the effects on the living

tissues, skin, nerves and bloodvessels; when the human body was introduced into this medium. A prevalent and not unfounded opinion of the beneficial operation of warm bathing in retarding the approach of old age, has given further confirmation to this mechanical theory. It was said that the practice was useful by relaxing and softening the rigid and indurated fibres of old persons. Lord Bacon had hinted that the tradition of Æson being restored to youth by means of the medicated cauldron of Medea, was, in fact, an allégorical representation of the warm bath in retarding the approach of old age. Darwin, adopting this idea, very properly adds, that the words *relaxing and bracing*, which are generally thought expressive of the effects of warm and cold bathing, are mechanical terms properly applied to drums or strings; but are only metaphors when applied to the effects of cold or warm bathing on animal bodies. He shortly after says, "to those who are past the meridian of life, and have dry skins, and begin to be emaciated, the warm bath, for half an hour twice a week, I believe to be eminently serviceable in retarding the advances of age." Acting on this principle, this learned physician relates that when Dr Franklin was in England he recommended the latter to use a warm bath twice a week, a practice which he afterwards continued till near his death.

"So early as the time of Homer an opinion seems to have prevailed of the utility of warm bathing in advanced life. When Ulysses, after his return to Ithaca, found his father Laertes reduced to great weakness, he advised him to use warm bathing, and to encourage him, told him he had seen one *whose case was exactly similar to his, worn down and*

emaciated with age, who, by the use of warm baths, very quickly recovered his appetite and rest. He likewise adds, that its efficacy in such cases was well known, and that it was a common custom among old men." Odys. XXIV.*

Marcard, in his excellent work on baths, examines with much ability into the correctness of the reputed relaxing and heating effects of the warm bath; for both opinions have been held, and these, at times, by the same person. This author maintains the negative of both propositions, and, as we believe, with success. He cites cases, which occurred under his own eye, of recovered strength under the use of the warm bath; and he adduces Falconer's experience as identical with his own, in this respect. He also enumerates various instances of persons who resorted to the warm springs of Germany and Switzerland, spending many hours at a time in the bath, without any sensation of exhaustion on the one hand, or of excitement on the other.

Marcard asserts, and in this assertion he is supported by most other writers and experimenters, that immersion in a bath of a temperature under 96° Fahrenheit, diminishes the frequency of the pulse, whenever peculiar or anomalous causes are not opposed to this effect. The more frequent the pulse, and the more it deviates from the natural standard, the more readily is its frequency diminished in the bath. That temperature, which to him seemed to exhibit this sedative power in a most marked manner, was between 96° and 85° Fahrenheit; though he acknowledges that he made few experiments on bathing in a cool or cold water. What we know of the effects of

* Buchan.

this latter operation satisfies us, and I have furnished the reader with sufficient data to be himself persuaded of the fact, that there is a still more marked diminution of the activity of the functions in a cold than a warm bath. This author himself admits explicitly in another part of his work, that the cold bath uniformly renders the pulse slower. The more the bathing is prolonged, the greater, according to Marcard, is the sedative power. He found in his own case that, after a stay in the water of an hour and a half, his pulse fell from sixty-three to fifty-four beats in a minute. Exceptions to these general results are, however, he admits, not unfrequently met with; and he is disposed to refer them with much plausibility to an extreme mobility or irritability of the nervous and sanguiferous systems.

Growing out of this remark is a caution of some importance to the experimenter on bathing. It is, to ascertain the irregularities of circulation, as well those caused by variations of posture as those occurring at different times of the day. In a person of much sensibility to the stimulating impressions of external heat and alimentary matters, or of habitual irritability of circulation, the pulse undergoes very great alterations, some of which might be erroneously attributed to immersion in a bath.

During last summer I had begun a series of experiments on myself, but after a while I desisted, on finding that the difference in the number of my pulsations in a minute was so great, between the standing and the recumbent postures, that no very satisfactory inference could be drawn from the effects of immersion in a warm or tepid bath, in which I was, of course,

placed in this latter position. I had noted the great retardation of pulse, owing, as I conceived it to be, to the temperature of the bath. On one occasion, for example, July 20, 1830, at noon, the air being 88° Fahrenheit, my pulse seventy beats in a minute, skin moist after exercise, but without my feeling any fatigue, I found, after three minutes immersion in a bath of 90½° Fahrenheit, the pulse fall to sixty-five. After the lapse of a quarter of an hour it was the same. The water felt to me decidedly cool. After dressing, the pulse was eighty. The next day, at one P.M. the thermometer being 88°, pulse eighty-two, I went into a bath of 94°. Shortly after immersion the pulse was sixty-five, but in ten minutes it rose to seventy. I remained in the water an hour, and the pulse continued the same, when I was out and dressed. Two days afterwards, July 23d, at six A.M., after having been up all night on professional duty, I went into a bath of the temperature as before. Pulse, which was at seventy-eight, fell to sixty-eight, and so remained for half an hour. After coming out of the bath the pulse rose to seventy-eight. July 31st, noon, pulse seventy-three, some pains of the joints and disturbed digestion, I entered the bath at 98°. In two minutes the pulse was diminished by eleven beats, that is, fell to sixty-two; in five minutes it was the same; after the lapse of three quarters of an hour it was seventy; on leaving the bath it was eighty-three. So far the powerfully sedative effect of the warm bath would seem to have been displayed in my own person; but the following circumstances will show how liable an experimenter is to fallacy, in drawing inferences without attention to all the qualifying circumstances of the case.

August 2d, my pulse, at half past twelve in the day, when I placed myself in a recumbent posture (lying down), gave sixty-six beats in a minute. When I reclined against the back of a settee it gave seventy-four to seventy-six; when sitting up erect it was eighty to eighty-two; and when standing was eighty-six to eighty seven. After making these observations I walked a short distance to the bath room, reclining in which my pulse was seventy. On immersion in the bath, in water of 93°, the pulse was sixty: raised the temperature of the water to 98° Fahrenheit, after which the pulse was augmented to seventy-eight. In my own room, in half an hour afterwards, the pulse, while I was sitting up, was seventy-eight; when in a recumbent posture it was sixty-two. Had I not previously ascertained the difference in the pulse caused by a recumbent posture, I should have been not a little surprised in comparing its beats, while I was standing, or sitting in a chair, and while I was in the water; the difference was equivalent, in the case of standing, to twenty, and in the latter, or sitting, to sixteen beats in a minute; all of which I should, as possibly some under similar states of circulation have done before me, have attributed to the sedative influence of the warm bath. Whereas, the real extent of change was not more than ten, comparing similar postures; the one in the bath room, the other in the bath itself, or six beats, comparing the recumbency in the water with the rather more complete prone posture in my room, during the first observations on the pulse. August 21st, half past twelve in the day, temperature of the air 88°; I had been walking all the morning and suffered from some gastric uneasiness: my pulse, while I stood up in the bath room, gave ninety-eight beats in

a minute—sitting on a chair it was eighty-four—reclining on the floor it was seventy-two—entered a warm bath at ninety-four degrees, and in five minutes the pulse was sixty-seven to sixty-eight—after half an hour the same. On coming out of the bath, and partially dressed, and in a reclining posture, it was sixty-seven—sitting up in a chair, seventy-four—standing, ninety-two beats. This would seem to be a still more marked case of the great influence of the warm bath over the pulse, had I not made the suitable precautionary and qualifying observations in respect to posture.

The inference, after all, from these and some other similar experiments on myself, is that the warm bath has a tranquillizing effect; and by allaying excessive excitement and moderating excessive heat, it refreshes and in a measure invigorates: but of this more anon.

It will be seen that the range of temperature of water, on which Marcard experimented, includes my divisions of both the tepid and warm bath. Occasionally the experiments of this author, and of others whom he cites, were varied, so that the water was gradually reduced to coolness—the effect was a still more signal diminution of the pulse's frequency. Thus in the case given by Marteau, of a man in health whose pulsations at the wrist were, at the time, eighty-six in a minute, it was found that after two minutes stay in a bath of the temperature of 68° , the pulsations were reduced to sixty-seven—in a quarter of an hour to sixty-six—and after an hour to sixty-one. In another, related by Marcard, the subject of the experiment, a healthy man accustomed to the cold bath, and whose radial pulsations were eighty in a minute, went

into one of 60° Fahr. After a lapse of fifteen minutes the pulse was eighty-two; but the bather was restless, and moved about greatly in the bath. On his keeping perfectly still, at the request of Marcard, the pulse fell after the lapse of forty-five minutes to seventy-two; between which and seventy-five it remained. After he came out of the bath, although there was reaction, as far as regarded a very evident heat, Marcard calls it burning of the skin, the pulse still kept at seventy-two beats in a minute.

The respiration underwent, in the baths of which I have just been speaking, a retardation, correspondent with that of the circulation. Buchan seems inclined to admit more readily the former effect than the latter. Dr Murray* says, When the heat (of the bath) is below 95° the pulse and respiration become slower, almost in proportion to the degree of coldness, to 88°. This author cites the opinion of Duncan respecting the effects of the warm bath, which in the main are so judicious, that I shall give insertion to them here.

“The warm bath excites the sensation of warmth partly because our sensations are merely relative, and partly because its temperature, though less than that of the internal parts of the body, is greater than that of the extremities, which are the chief organs of touch. But as water is a much better conductor of caloric than air, and especially than confined air, as much caloric is abstracted from the body by water, which is only a few degrees lower than the internal temperature of the body, as by air of a much lower temperature. The warm bath diminishes the fre-

* A Dissertation on the Influence of Heat and Humidity, &c. By James Murray, M.D. London, 1829.

quency of the pulse, especially when it has been greater than natural; and this effect is always in proportion to the time of immersion. It also renders the respiration slower, and lessens the temperature of the body, relaxes the muscular fibre, increases the bulk of the fluids by absorption, removes impurities from the surface, promotes desquamation and renewal of the cuticle, and softens the nails and indurations of the skin." The immediate conclusion drawn from these effects by Dr Duncan, that the stimulant power of the warm bath is considerable, is quite unexpected, and must seem the more strange to the reader, when he learns that this writer recommends it as a remedy in diseases of increased morbid excitement.

One of the effects of the warm bath, in disposing the skin to a more ready absorption of the fluid applied to this surface, as well as of various substances held in solution, need not detain us long. The question has been much agitated of late years, and the result of numerous and diversified experiments allows us to settle down in the opinion, that a simple, and at times, though with more difficulty, a medicated fluid of a somewhat elevated temperature will permeate through the epidermis or scarf skin, and reaching the cutis vera be absorbed into the circulation. This process, at one time supposed to be very active and performed with every variety of fluid or semi-fluid substances, even to the extent of their nourishing the body by this means, has of late years been regarded by physiologists as of much more restricted range and importance. The contradictory results of experiments on absorption, as far as regards augmented weight of the body after bathing, are readily explicable by the now generally admitted fact

of secretion or exhalation also going on with considerable rapidity, contemporaneously with the other and opposing function.

It now remains for me to state the real influence of the warm bath over the functions of the animal economy. If it be not relaxing, in the common acceptance of the term, nor heating, nor stimulating, in what manner and under what circumstances does it display its good effects? Should we reply, that it acts as a sedative, by moderately absorbing heat, and rendering the respiration and circulation slower—this will not be deemed an adequate explanation, since cold, a much more powerful sedative, has not the same effects. And yet we are not allowed to doubt of the tranquillizing and soothing, in fine, of the sedative operation of warm bathing. There seems to be, however, this difference between the cold and the warm bath, that while the former depresses at once, and powerfully, the circulating and nervous systems, benumbing and rendering them torpid even unto death, or preparing for a violent and irregular reaction—tingling and glow, the latter is just in that relation with the nervous system to convey a sensation, soothing by its mildness and active by its diffusiveness, and with the capillary system to invite blood into the smaller vessels of the extremities, which were of a temperature less than the water, and thus produce an equal yet moderate fullness and action of these vessels; an effect still further insured by the softened and diminished resistance of the external tegument, or cuticle. This equalised fulness of the cutaneous capillaries is doubtless sympathized in by the membranous ones generally, and thus the resistance to the heart's propulsive power is less, and its contractions are in consequence fewer, and at the same time more

equable. The same cause renders respiration easier and slower. Another cause of this latter effect is the diminished action and rest of the brain. In evidence of the warm bath exerting that pleasurable influence over the nervous system, on which its effects in a great measure depend, I may mention its tendency to produce sleep—a state alike removed from either class of sensations, the excitingly pleasurable or the excitingly painful; and a state which may be brought on by gentle friction exercised with a smooth and soft body, such as the hand, over the skin—the same surface on which the warm bath exerts its primary and chief influence. For obtaining natural sleep also, the temperature must be pretty equally diffused, and the skin in tolerably uniform apposition with its protecting envelopes of clothing, not unduly pressed upon, nor stimulated, nor exposed in any one quarter. All these conditions are obtained by the warm bath; and hence we find an explanation of a universally observed and recognized fact, that immersion in such a medium is eminently favourable to sleep. The sleep here is natural and different from that fatal sleep—the torpor of the brain from extreme cold, or from that forced sleep brought on by diminishing the sensibility of the nerves and stupefying the brain by narcotic drugs. But it is not necessary to take sleep as the representative and final effect of the beneficial operation of the warm bath. Its soothing influence is clearly enough evinced in the pleasant rest enjoyed by the senses, the brain and the muscular apparatus for voluntary movement, and in the harmonized action and balance of the internal or nutritive organs. And if to the warm bath be added the oriental accessory of gentle friction of the skin, the person subjected

to these processes will more than realize all the boasted effects of animal magnetism.

Exercising such a marked influence over the entire nervous system, including the internal and external senses and the brain, and over the circulation and respiration—we cannot be surprised at the eulogies which have been lavished on the warm bath; nor find any difficulty in understanding how it should exert indirectly invigorating effects. A person, after labour or a long journey in a hot day, suffers from feelings of heat, thirst, accelerated circulation, and excited senses; all of which are removed or allayed by warm bathing. This application, by being of a temperature just adapted to the regular wants and conditions of the skin, maintains the action of the vessels of this latter, and prevents them from falling into a state of indirect debility with irregular evolution of caloric. The blood, which was forced into the capillaries of the other membranes, in like manner, during the active exercise of the body, would also be in part exhausted by the secretions, and on repose coming on retire and leave the vessels imperfectly supplied—while at the same time there would be accumulation of this fluid in the glandular and other internal viscera, with feelings of inward heat and oppression. The warm bath, by preserving the requisite fullness of the vessels of the membranes, prevents undue accumulation in the glands and parenchymatous structure—relieves the former of feelings of weakness, and the latter of oppression. The irritable and excited senses and brain are soothed, as well by the abstraction of the superfluous caloric as by the direct influence of the bath on the sentient portion of the skin. Hence while strictly admitting the counterstimulant, or sedative and

tranquillizing action of the warm bath, we can understand how it should give feelings of renewed strength, by removing and quieting irritation and morbid excitement, which are, as we see in fever, inflammation, &c., most enfeebling and exhausting to the human frame.

After the fatigues of a journey, gymnastic exercises, or the chace, the warm bath is peculiarly fitted to renovate and refresh. Bruce, in his travels to Abyssinia, says explicitly, that when he felt an almost intolerable inward heat, and was so exhausted as to be ready to faint, a warm bath soon made him feel as much invigorated as on his rising from bed in the morning. "Some persons may tell me," he continues, "that the heat of the bath must weaken and enervate, but I can assure them that the reverse is the case." He afterwards, in speaking of the cold bath, says, it is an erroneous notion that this latter bath will act as a tonic in a very hot climate. He gives his own experience, as proving, that, when overheated by violent bodily exercise, a warm bath cooled him and renewed his strength much better than a cold one of the same duration. We should err, however, if we supposed the two varieties of bath as quite contrasted in their nature and effects. They both abstract caloric—both moderate vascular excitement and allay nervous irritation—but the cold diminishes the animal temperature so much, and depresses so powerfully the function of calorification, as rather to stupefy and render them torpid in common with the nervous system at large—while the warm bath merely abstracts the superfluous caloric, without still farther enfeebling organs which may have been already thrown into a state of indirect debility by much prior excitation.

High vascular excitement, with nervous irritation, as marked by hot skin and the other symptoms already mentioned, is often allayed by cold bathing: that vigorous state of health, in which there is excess of caloric and general vigour, will tolerate, and often be benefited by it. But a mixed state of excitement still persisting, after it has much exhausted the individual, together with internal heat and thirst and rather a cool skin, or the temperature of this surface unequal, will demand in a more peculiar manner the resource furnished by warm bathing. The habitually feeble and infirm, the nervous and excitable, and the cold and lymphatic constitution, ought all to use the warm rather than the cold bath. Persons advanced in life, whose functions preserve a tolerably equal rhythm, but who have little energy of reaction under depressing agencies, or, as expressed in popular language, little strength to throw away, must give the preference to the warm bath. They who are readily heated, and as readily cooled; who, though weak in their muscular movements, are prone to vascular or nervous excitement, and febrile movements from the least increase of mental or corporeal exercise and stimulation of the senses, should imitate the same practice. Warm bathing has been already spoken of as beneficial to persons in advanced life, by softening the cuticle, the increasing induration of which at this time has a tendency to obstruct perspiration.

From what has been said of the direct operation and effects of the warm bath, we are prepared to state in advance, the range of diseases in which it will exert a curative agency. In the first place, all morbid exaltation of sensibility, acute pain, alone or accompanied with irregular and convulsive action of

the muscles, will be greatly mitigated, and often even removed by this remedy. Its use is particularly called for in the *convulsions* of children and the *hysterical affections* of females, as well as in the varieties of colic, from the simple spasmodic to the bilious and painter's (*colica pictonum*). We are not to forget, however, in these, as indeed in all other maladies marked by convulsive movements of the muscular system, the importance of removing the local irritant, or mitigating by means directly applied to the part itself, the local irritation on which we find the sympathetic and often alarming disturbances of the brain, muscles, and blood vessels, as in delirium, convulsions, and fever, to so frequently depend. But, although we may not entirely cure or arrest the disease by warm bathing, we shall mitigate its violence, and gain time for the application of other remedies. Even after the removal of the offending material agent, the part first irritated by it is left in such a state as to transmit for a time morbid impressions to remote and important organs, on the mere application of a common and natural stimulus. It is thus that the removal of a splinter or a thorn from the hand or foot, of a decayed tooth, of the undue pressure exerted by dense fibrous tissue on a protruding infantile tooth, of worms, and irritating ingesta from the alimentary canal, although productive of marked relief, is not always attended with an entire cessation of the convulsions and other disturbances in the animal economy, which were originally produced by one or other, respectively, of the above mentioned irritants. The brain and heart are also, in some persons, peculiarly responsive to the slightest deviation from the customary healthful excitement, as well as to the remains of

irritation in disease. Warm bathing, under all these circumstances, is an excellent means of soothing the nervous and sanguineous system, and of preventing a convulsive habit from being formed.

Children, more prone than adults to convulsions, are in a more especial manner benefited in these cases by warm bathing—owing, we may presume, to the sympathies of the skin with the brain, and indeed with all the important organs of the economy, being more active and diffusive than in after life. In cases of great determination of blood to the head, with throbbing temples and flushed cheeks, independent of other remedies, it may be proper to apply cloths wet with cold or iced water to the head while the patient is in a warm bath.

The same practice has been found to be eminently serviceable in *mania* and *mental derangement* generally, in which extreme wakefulness and dry skin are predominant symptoms. Esquirol orders the warm bath to be continued two hours, and sometimes eight hours daily, and never finds it to induce debility, after forty-eight hours are allowed to elapse before its repetition. Warm pediluvia, and the hip bath, are often used to soothe maniacal ravings.

In *bilious colic*, the acuteness of pain is best allayed by the warm bath and a full dose of an opiate—immersion in the water to be continued for at least half an hour, and if need be an hour, or even longer. This is the treatment adapted more particularly to tranquillize the nervous and muscular systems, and if resorted to at the beginning may be sufficient: but after the disease has persisted so long that the membranes of the gastro-intestinal surface are injected, and the vascular system called into active and per-

turbating sympathy, then is free sanguineous depletion demanded in addition to, we may say conjointly with, opium and warm bathing. In *colica pictonum*, these two last mentioned remedies are of primary importance, and more entire reliance may often be placed on them alone than in bilious colic or other gastro-enterites.

Infantile cholera, and *cholera morbus* as it attacks adults, often imperatively call for the use of the warm bath, where there is much coldness of the skin generally, or of the extremities. This state is of more frequent occurrence in the latter of these two diseases: in it, warm water, externally applied by immersion, and internally by enemata, will be often found of paramount importance. *Cholera infantum* requires a bath the temperature of which shall be in the inverse ratio of the heat of the skin—the greater and more acrid the latter, the colder will be the water, and, *e contrario*, a cold skin, especially after the disease has been of some duration, will be most benefited by warm immersions or affusions. The same rule guides us in the temperature of the enemata. And here I may remark, that on the judicious application of this simple remedy, water, in the manner above stated, and the administration of mild diluent drinks, with the timely use of the lancet, and local bleeding by cups and leeches, will mainly depend the practitioner's success in the infantile cholera, a disease often so rapid in its course and fatal in its termination in our cities. However mortifying such an opinion may be to the pharmacologist, it is one which I have arrived at after much and careful observation, and a range of experience, including both public and private practice, by no means limited.

With few additions the same remarks are applicable to the treatment of *dysentery* and *diarrhæa*, more particularly of the *chronic* kind. Frictions over the skin generally, and especially over the abdomen, will be found a useful adjunct to the warm bath in these forms of disease.

Warm bathing is a remedy adapted to all the diseases of the respiratory passages—due attention being had to the stage and accompanying phenomena, and the peculiarities of constitution of the sick person. In *croup* the remedy is one of undoubted power—but its reputation is often diminished, and, still worse, its utility marred, by inattention to the temperature of water and to the duration of the bath—tepid being often used for warm water, and a few minutes in place of one or two hours immersion being practised. Where the extremities, and surface generally, are cold and pale, the bath might be nearly 98°—flushings of the face, with some symptoms of general excitement and fever, will demand that it should be two or three degrees lower.

Catarrh and *influenza*, whether incipient or chronic, are greatly mitigated, and at times cured by warm bathing—the degree of temperature of the water from 92° to 98°, varying with the heat of the skin and evidences of febrile excitement. *Bronchitis*, especially of the sub-acute or chronic form, is benefited by the warm bath, which, placing the capillaries of the lungs in a state somewhat analogous to those of the skin, disposes the mucous membrane of the former organ to a free and copious expectoration. It is difficult to lay down with precision the circumstances under which this variety of bathing is proper in *pulmonary consumption*, but we are not allowed to doubt of its useful

character in this disease, by palliating many unpleasant symptoms, and keeping the skin clear of those accumulations and obstructions which frequent hectic sweats are so apt to produce. In that variety caused by bronchitis the remedy will be of especial moment.

Asthma, of the nervous or spasmodic kind, is greatly relieved by warm bathing. When the disease depends, however, on a turgid and injected state of the mucous membrane, and is aggravated by a dense clouded atmosphere, we are not to anticipate the same good result from this remedy.

Organic affections of the heart, of which asthma is sometimes a symptom, cannot be better treated than by the regular use of the warm bath; which is more especially serviceable if the disease have ensued on the disappearance of chronic cutaneous eruption or ulcers.

Inflammations of the liver, and particularly chronic affections of this organ, in which the skin is so often dry and rough, and impeded in its functions, are greatly relieved by warm bathing; without the regular use of which we shall be baffled in obtaining the desired effects from other remedies employed at the same time. Chlorine and nitro-muriatic baths have been extolled by different writers, in hepatic disorder. Admitting fully the benefits which have ensued from their administration, it is difficult, however, to say how far they have been dependent on the medicated bath; or whether they would not have resulted from regular immersion in simple warm water.

In nephritic disorders and affections of the urinary organs in general, warm bathing has long enjoyed great and deserved reputation. It allays pain and ir-

ritation, and aids the passage of calculi through the ureters, in nephritis: by its beneficial action on the skin it mitigates the severity and sometimes carries off a paroxysm of that most distressing malady *catarrhus vesicæ*.

Amenorrhœa in females of what is called a rigid fibre is occasionally removed by the warm bath, or even by a persistence in the regular use of warm pediluvia.

In no class of diseases is the curative agency of warm bathing more evident than in those affecting the skin. Some of the most obstinate herpetic eruptions have yielded to this remedy, or to bathing in tepid water. Indeed it, in conjunction with a milk regimen, is often all powerful in the removal of these diseases, after the whole list of alteratives and depuratives had been gone through in vain. Where there is much heat and irritation by itching, the temperature of the bath should not at first exceed 90°. After a time it may be raised to 95°. On occasions the parts ought to be fomented with a simple mucilage, or decoction of mallows, or of bran. Russell, in his "*Œconomy of Nature*," relates the cases of three persons tormented with moist herpes, the successful treatment of which consisted mainly in directing this application; and I have myself obtained the like success in this form of eruption from the same remedy, after mercurials and antimonials had been tried in vain. Sea bathing aggravated the eruptions in Russell's patients. Marcard tells us of a course of warm bathing entirely curing an obstinate scabies of the head and face.

In the early or forming stage of *fevers*, as we generally understand the term, a warm bath frequently repeated would go so far as to arrest the

malady, or at least singularly mitigate its violence; and in the convalescent period when there is still, with great languor and feeling of exhaustion, a dry and rough skin, undue sensation of heat in the palms of the hands and the soles of the feet, and thirst disproportioned to the appetite for solid food, together with much irritability and wakefulness, this remedy may be employed with signal advantage. In the chill of intermittent fever, or still better when the premonitory yawning and slight rigors are expected, immersion in the bath, until the reaction is complete, will often prevent the coming on of the hot stage, and give rise in its stead to a mild perspiration. Some more vaguely recommend the patient to be immersed in the bath raised to blood heat on the day of the fit, and to remain in the water as long as his strength will allow.

The warm bath has long been a popular remedy in exanthematous diseases; but its use is unfortunately for the most part empirical. Regarded as a mere means of applying external warmth, it is in consequence often prescribed, alternately with thick and warm clothing, and internal stimuli, to bring out the eruption, when this is slow in appearing, or has suddenly receded. Persons acting in this way would seem to be ignorant of the very important fact, that in acute eruptive fevers, the very violence of cutaneous irritation will prevent the appearance of the eruption, in the same way that it does sweat; and that to bring out either we must mitigate the irritation by cooling applications. If the skin be very hot and acrid, cold affusions, or sponging with cold water is, as already mentioned, the appropriate remedy. Should this surface be cool, or of a heat little exceeding the usual temperature, or what is more

probable, the heat about the trunk very great, and the extremities cold, then will the warm bath, by general immersion, or partially, in the form of a pediluvium, be found eminently serviceable. After the eruption has appeared, sponging the skin with tepid or warm water is soothing, and especially applicable where the constitution is lymphatic and the sympathies not very energetic between the skin and the digestive and respiratory surfaces. But distinct from the indications furnished by the mere appearance or absence of the eruption, we shall derive no small benefit from the warm bath, by having recourse to it on the appearance of the premonitory symptoms, with a view of mitigating the violence of the fever during the first stage. Used at this time, the remedy will give relief to the internal organs, especially the respiratory and digestive ones, by exercising a moderate revulsion to the skin, in as far as preserving its entire capillary tissue of a moderate degree of fullness shall contribute to this end. The internal organs and surfaces thus relieved will suffer less from irritation, and transmit it with less force to the skin, hence the eruption will be milder, and go through its stages with diminished violence and danger. The whole intention at this time is to restore, or prevent from being lost, that equilibrium between the different surfaces and organs which exists in health. If under the above circumstances, before the excitement of the skin was regularly established, we had recourse to the cold bath, it would render this surface at first torpid, and through it the internal organs, and subsequently give rise to troublesome and irregular reaction—whilst, on the other hand, were the hot bath resorted to, the consequent undue excitement of the skin would

be transmitted to those organs, from which it would be reflected back on the skin, with the effect of causing painful irritation of this membrane, and excessive eruptions; or, if the excitement were still more intense, of substituting a general redness for the more distinct eruption. In fine, by the employment of the warm bath in these, as in all other diseases in which its usefulness is recognized, we bring back as nearly as may be the functions to their natural rhythm; we simplify what would otherwise be very complex; and we put ourselves, as careful observers, in the most advantageous position for availing of other resources to combat new or alarming symptoms, which may supervene in the progress of the malady. Some of these symptoms may be such as to require the cold bath; or others, though of more rare occurrence, such as to call for hot and vapour bathing. Of the former of these remedies I have already spoken in detail; of the latter I shall soon treat.

There are few tissues which so readily sympathize with the skin as the synovial and fibrous; as we are sadly convinced by our suffering from pains in the joints and limbs, after exposure to cold and moisture. And we may add, that few diseases are so promptly and completely relieved as those are by the judicious use of the warm bath. In the more acute and atrocious pains of gout and rheumatism, this remedy will mitigate and soothe their severity; while those of the more chronic kind are often completely removed by a regular course of warm bathing, and suitable friction of the skin over the parts affected. The state of the pulse and skin will guide us in the temperature of the water which we shall direct: if

there be febrile action, with thirst and little or no appetite, the bath may be tepid; when there is little activity of the skin and circulation, immersion in warm water at nearly blood heat is preferable.

To those who have not frequently seen or experienced in their own persons the effects of warm bathing, after recent suppression of perspiration and pain in all the muscles and joints, as in the beginning of influenza and rheumatism, the surprising relief which it gives would seem to be marvellous. I have myself, after a cold, been at times unable to walk without pain at every step in all the muscles of the limbs and trunk, and actually halted when going to the bath; but after remaining in it at the temperature of 96°, for three quarters of an hour or an hour, have come out entirely free from pain, and returned to the house with feelings of entire comfort and a free and easy step.

The morbid sensibility and pains in the limbs, which often follow a mercurial course, are very happily abated by the remedy now under consideration.

Paralytic affections, in which there is still some remains of that excitement which preceded the attack of paralysis, will bear very well a course of warm bathing. In this stage of the disease a hot bath would be prejudicial.

Surgeons know how to avail of the soothing effects of the warm bath, when they prescribe it before an operation, as well as afterwards, to allay irritation and tendency to spasm. In the reducing of dislocations, it is an aid of no small efficacy; as also in the reduction of hernia. In both cases, the operator must not be discouraged at his want of success on first trials—but persevere in the employment of the re-

medy for one or two hours, or even more, until languor approaching to faintness shall be experienced by the patient.

The proper time for using the warm bath, when had recourse to as an agent of hygiene, is when the stomach is empty, either before breakfast, or, what will be found still more conducive to comfort, before dinner. Some give the preference to the evening just before retiring to bed; and in certain constitutions when a light and early dinner has been taken, it may be used at this time with advantage. Remembering, however, that towards evening most persons, and especially invalids, experience a little increase of excitement, marked by accelerated pulse, we must not be surprised if a warm bath nearly at blood heat should not be sufficient to abstract the superfluous caloric at this time in the system, or to moderate the excitement. In such a state of the system, the water should be used at a lower degree of temperature than would be required earlier in the day. But the case is different if the person have been engaged in active muscular exercise, protracted labour, a fatiguing journey, and the like. Then the bath should be of the warmth already indicated, viz: 95°.

We should infer from Plutarch's description of the banquet of the seven wise men, that the Greeks were in the habit of using the warm bath previously to the principal meal, which was taken about four o'clock in the afternoon. Each of the guests, as he arrived, was conveyed to the bath before he entered the supper room, except Thales, who refused to go, declaring that he had already bathed. From this we also learn that it was customary to bathe either at home, or at the house of the person by whom guests were invited, previous to

their sitting down at table.* They who came from a journey were washed and clothed with suitable apparel in the house of the entertainer, before they were admitted to the feast. The Greeks were very attentive to personal cleanliness. Not only when they put off mourning, when they returned from war, or had finished any hard labour, did they bathe and anoint themselves, but also, as we have just seen, before they went to any entertainment, and whenever they came from a journey. The practice of the Romans was nearly analogous. After leaving their magnificent baths, which are described in the first chapter of this work, they were anointed with scented oils, and went immediately to supper.

Illustrative of the proper time for using the warm bath, is that account of his own experience in this matter left by Count Rumford. As it will no doubt interest the reader, I shall here subjoin his own words.

“Being at Harrowgate, on account of my health,” says the Count, “I at first went into a bath warmed to about 96° of Fahrenheit’s thermometer every third day. At first I went into the bath at about ten o’clock in the evening, and remained in it from ten to fifteen minutes; and, immediately on coming out of it, went to bed, my bed having been well warmed, with a view to prevent my *taking cold*.”

“Having pursued this method for some time, and finding myself frequently feverish and restless after bathing, I accidentally, in conversation, mentioned the circumstance to an intelligent gentleman, who happened to lodge in the house, and who had long

* Buchan.

been in the habit of visiting Harrowgate every year. He advised me to change my hour of bathing, and to stay longer in the bath, and, above all, to avoid going into a warmed bed on coming out of it. I followed his advice, and shall have reason, all my life, to thank him for it.

“ I now went into the bath regularly every third day, about two hours before dinner, and staid in it half an hour; and on coming out of it, instead of going into a warmed bed, I merely had myself wiped perfectly dry with warmed cloths, in a warmed room adjoining to the bath; and dressing myself in a bed-gown, which was moderately warm, I retired to my room, where I remained till dinner-time, amusing myself with walking about the room, and with reading and writing, till it was time to dress for dinner.

“ The good effects produced by this change of method were too striking not to be remarked and remembered. I was no longer troubled with any of those feverish heats, after bathing, which I experienced before; and, so far from feeling *chilly*, or being particularly sensible to cold on coming out of the bath, I always found myself less sensible to cold after bathing than before. I even observed repeatedly, and invariably, that the glow of health, and pleasing flow of spirits, which resulted from the full and free circulation of the blood which bathing had brought on, continued for many hours; and never was followed by any thing like that distressing languor which always succeeds to an artificial increase of circulation, and momentary flow of spirits, which are produced by stimulating medicines.

“ I regularly found that I had a better appetite for my dinner on those days when I bathed, than on

those when I did not bathe; and, also, that I had a better digestion, and better spirits, and was stronger to endure fatigue, and less sensible to cold in the afternoon and evening.

“As these favourable results appeared to be quite regular and constant, I was induced to proceed to a more decisive experiment. I now began to bathe every *second day*; and, finding all the advantageous effects which I had experienced from warm bathing still continued, I was encouraged to go one step further, and I now began to bathe *every day*.

“This experiment was thought to be very hazardous by many persons at Harrowgate, and even by the physician, who did not much approve of my proceedings; but, as no inconvenience of any kind appeared to result from it, and as I found myself growing stronger every day, and gaining fresh health, activity, and spirits, I continued the practice, and actually bathed *every day*, at two o’clock in the afternoon, for half an hour, in a bath at the temperature of 96° and 97° of Fahrenheit’s scale, during *thirty-five days*.

“The salutary effects of this experiment were perfectly evident to all those who were present, and saw the progress of it; and the advantages I received from it have been permanent. The good state of health which I have since enjoyed, I attribute to it entirely.”

Rumford very properly exposes the fallacy of that reasoning which would lead us to abstain from the use of the warm bath, for fear of its rendering us more liable to catching cold. On this subject I have already expressed myself in detail, and shall not further dilate on it at this time. It has been justly said, that a person has, in fact, no more occasion to dread

catching cold after having been in a warm bath, than he has from going into the open air, on a frosty morning, after leaving the room. . If I may be allowed to cite my own personal experience on this question, I can freely declare that during the last few winters in which I have used the warm bath, so far from my liability to catch cold having been increased by it, I have actually suffered less than heretofore, in this way.

The *duration* of the warm bath will be very much longer than that of the cold. While an immersion of a few minutes, and on occasions a single plunge in the latter is sufficient, we may remain in the former for the purposes of refreshment from half an hour to an hour. Many take a pleasant sleep in the warm bath.

The usages in respect to the time spent in the water of some of the thermal springs in Europe are calculated to excite the surprise of the reader. At Baden, in Switzerland, they resort to the bath four or five times a day. At Pfeffer, the time of bathing lasts from seven to twelve hours, and the treatment is protracted to two months. At Leuk or Loeche, a small town in the Valais, six leagues from Sion, the bathers pass the greater part of their time in the water. The buildings for the baths are divided into four grand compartments, each capable of containing twenty persons. At each angle of the compartments is a small cabinet, in which the bathers undress and dress, and from which there is a slight descent to the water. Two of them are kept at an elevated temperature by means of stoves. A pipe furnished with a cock supplies the water of the spring* either for the purposes

* The temperature of the several springs at Leuk is from 111 to 124 degrees Fahrenheit.

of drink, or in order to keep up at a suitable temperature the water of the bath. Both sexes, suitably attired, bathe together. They are seated either on chairs, or on an estrade, which runs round the room. Thus situated—partially immersed in the warm water, they converse, read, or even take refreshments, according to their several tastes. Many of the bathers have before them a small floating table, on which are placed their breakfast, glass, handkerchief, books, and newspapers. One may readily conceive of these baths being, independently of their curative power in disease, an excellent school for politeness, and for acquiring a certain easy, graceful flexion of the body and movements of the hands and arms, either by the ladies doing the honours of the tea-table; or by a gentleman seconding his expression of admiration of a favourite passage by just giving his table impetus sufficient to float the work to some fair one opposite; or requesting her acceptance of a bouquet of Alpine flowers—for these tables are frequently thus decorated by the Valaisan girls of the neighbourhood—and we are told that the vapour from the thermal water of the bath preserves for a long time the pristine verdure and beauty of the plants and flowers exposed to it. In order the better to insure equality for the time being, and to keep away all jealousies and discord which might grow out of the emulous adornment of dandies and belles, every bather is required to put on a dress, which for its plainness would meet the approval of St Francis himself. It consists of a large flannel gown, covering the whole body, and a tippet of the same to protect the shoulders from cold.

Short of three weeks bathing, a cure cannot, we are told, be promised. It is customary to begin with an

hour in the morning on the first day, two hours on the second, and so on, augmenting the time successively, till the patient continues in the bath eight hours a day—four in the morning, and four in the afternoon.*

Leuk is in a valley which is studded with pasturage and cultivated fields, and furrowed with torrents. The glaciers extend thus far. It is even at the base of the glaciers—of mountains eternally frozen, that these thermal waters escape, exhibiting one of those contrasts so beautifully portrayed by Haller, in his fine poem on the Alps. What adds to the singularity of the scene is, that at the distance of some steps from one of the principal thermal springs, there rises a spring of cold water.

After all, whatever virtues we may concede to bathing and drinking the waters at these springs, we cannot doubt that a bright cerulean sky, the variety of picturesque situations, and the extreme purity of the air at Leuk, contribute largely to those wonderful cures which have been narrated to us by physicians and travellers.

The Swiss practice is common at Laudeck, in Silesia, where, according to Burgort and Bach, six hours are passed daily in the water; and the cure is performed in from four to six weeks.

At Aix la Chapelle, where Charlemagne spent a portion of his time, it was common for this celebrated man to hold his levee in the warm bath, which was supplied by one of the numerous thermal springs of that city.

After these accounts, we feel less surprised at the case of a lady, attacked with spasms, treated by Pom-

* Alibert and Patissier, *sur les eaux minerales de la France.*

me: he kept her in the warm bath twelve hours a day, and continued the practice for ten months, with the effect of curing her malady.

Bachetti, in his notices of the mineral springs of Porretta, states that he has seen the bath (warm) borne for two hours at a time, and repeated with incredible advantage. The persons who adopted this practice were, however, of the most juvenile and robust class—the aged and infirm could not have borne such a sedation as would have resulted from so long a detention in the bath.

The mineral springs at Caldas da Rainha, near Lisbon, averaging 92° Fahr.; the cross bath at Bath, England, ranging from 92° to 94° —the mineral waters at Aix, Bagneres, Adour, Baresges, Bonnes, Cambo, Cauterets, Dax, La Maloux, St Sauveur, Vichi, and others in France; those of Olmitella and Citara, some at Lucca, at Pisciarelli, Pozzuoli near Naples, St Julian near Pisa, in Italy, furnish natural warm baths of great efficacy, when employed either alone, or, what is most generally the case, conjointly with their internal use as drink. At some of these places the thermal springs are numerous, and have a temperature varying from 88° to 142° . When the spring is hot it is directed into a basin of cold water, and rendered of a pleasant and salutary warmth—unless it is to be used in particular cases as hot bath.

The Warm and the Hot Springs in Virginia, and the Warm Springs, in Buncombe county, North Carolina, furnish delightful natural baths for recreation and health. The bath at the Warm Springs, Bath Court House, Virginia, is of an octagonal form, and forty feet wide from one angle to the opposite one, and between five and six feet deep in places, and no

where less than four: the bottom is gravelly. The water of the spring which supplies it is of the temperature of 96° Fahr.; clear and transparent and emitting gas in large quantities. Few feelings can be more pleasureable than those which are produced by bathing in this water. Here, one is like a native of the Sandwich Islands, who after a long absence from home is at last landed on his native shore—he plunges into the liquid element in which he had been wont to desport himself in his earlier days, and by every variety of attitude and gesture endeavours to compensate himself for his past privations. After a few bathings in the Warm Springs, gouty and rheumatic cripples begin to exercise those joints which were immovable as though “by ankylosis knit;” and soon enjoy entire exemption from pain. The more juvenile and healthy, who bathe for pleasure, have to be reminded of the lapse of time, and cautioned against the undue exercise in swimming, which joined to a prolonged stay in the water cause diaphoresis and some subsequent languor and debility.

Two hours at a time are allotted for the ladies to take the bath, and the same period for the gentlemen, and so on alternately through the day. A white flag is hoisted as a signal that it is occupied by the former.

The water can be let off at the end of every bathing; and so abundant is the supply that the basin is soon replenished by the spring gushing up from the gravelly bottom.

The basin has over it a wooden building, open at top, and provided on both sides with small rooms, heated, when occasion requires it, by fires. It is here the bathers undress and dress: and here an attendant is always in waiting.

Lower down the meadow in which is the chief

spring which supplies the bath just described, is another warm one, the water of which is reserved for internal use. Close to it is a hydrant from which cold chalybeate water is procured. Near to these is a warm bath similar in temperature and other properties to the first—but of smaller dimensions and principally intended for the use of the more aged and infirm, and for children.

The *Hot Springs*, five miles from the *Warm*, are three in number. One of them is of the temperature of 96° Fahr. and of a moderate depth, and sufficiently capacious for several persons to bathe at a time. The bottom of the bath is of dark stone and pebble, which added to its being badly lighted gives it a gloomy appearance.

The following simple and easy mode of preparing a warm bath might be adopted with advantage to the sick who are often deprived of the good effects of warm bathing by the difficulty and expense of procuring a bath.—An oblong case, of a size and form just sufficient to contain the human body, is constructed of deal. This is carried into the chamber of the patient, and there filled about one third with water of the requisite heat, for which purpose, half the quantity of boiling water is more than sufficient. A stout sheet is next laid over the aperture, and kept tight under the feet of assistants standing on each side. Upon this cloth the patient is placed, and, by slackening it, gently sunk into the water. After having remained a due time in the bath, he is, by means of the sheet, lifted out of the water, and, without any personal effort, put on a mattress or on the floor, whence, leaving the wet sheet behind, he can be readily replaced in bed, and, if necessary, rapidly rubbed with a dry napkin or towel.

CHAPTER VII.

Important distinction between the warm and the hot bath.—A hot bath is that in which the water is above 98° Fahrenheit.—Effects of the hot bath on the animal economy—decidedly and strongly stimulating.—Zimmerman's observations.—Apoplexy, paralysis, and hemorrhage caused by very hot baths.—Experiments—transition from hot to cool bath.—Circumstances under which such transition is safe.—Why the drunkard suffers so readily from cold.—Sustained excitement favourable to resisting cold.—Temporary and feverish excitement also enables the body to resist great cold at the moment.—The Russian practice—cold affusions are required after a Russian hot bath, to moderate the intense and burning heat of the skin and other symptoms of excitement. Objections to the practice of hot bathing as a matter of hygiene.—In what subjects especially injurious.—Should only be directed by a physician, as a remedy for disease.—Circumstances under which it is useful—when injurious.—Hot bathing of great value in some diseases, as bronchitis and pneumonia, of old people exposed to cold and moisture, and of intemperate habits.—Pediluvia and partial ap-

plications of heat.—The hot bath useful at times in certain catarrhal affections of children, especially croup with very hot skin—care to watch beginning reaction, flushed face, &c.—also serviceable in some cases of cholera morbus—In various chronic affections, such as indurated skin and old herpes—morbid growths, thickening of parts—stiffness of joints from old sprains, and from chronic rheumatism and gout, the hot bath exerts a marked and beneficial effect.

I HAVE already taken some pains, and I hope not without success, to point out to the reader the important distinction between a warm and a hot bath—a distinction too often lost sight of, both in domestic practice with a view to the hygienic effects of bathing, as well as when advised by medical men with a view to its curative powers.

By a *hot* bath, we are to understand that in which the water is of a heat exceeding 98° Fahr. It is decidedly stimulating, and, in its often violent and marked effects on the human body, contrasts strongly with the more pleasureable impressions produced by the warm bath. This contrast must convince us of the impropriety of including the two under a common head, and of confounding their different powers. The hot bath, by imparting to the system an excessive dose of caloric, strongly excites the circulation, and proves a nervous irritant. As water, moreover, is much more dense than atmospheric air, the impression on the body immersed in it must be so much the more lively. In fact, we see that, in such a bath, the skin becomes red, the pulse is accelerated, the vessels are turgid, and respiration is more frequent; a copious sweat soon bathes the face; the arteries of the neck beat

with more frequency; the mind becomes obtuse and inattentive; and even vertigo and apoplexy supervene. If the bath be prolonged to excess, so great will be the quantity of perspirable matter secreted, that Le Mounier, in a bath of 111° to 113° Fahr., lost, in the short space of eight minutes, a pound and a half of his weight; after which, he was obliged to abandon the bath on account of the violent symptoms which he experienced, especially about the head (*Mem. de l'Acad. des Sciences*, 1747). Whether this loss was by cutaneous or pulmonary exhalation, or by both, it is not necessary to inquire: the practical deduction is the same. Even simple pediluvia, at a high degree of heat, sometimes produce the above effects to a considerable degree.

But we cannot better establish general principles on the effects and uses of hot baths, than by borrowing the language of the celebrated Zimmerman, who, in his valuable work, "On Experience in Medicine," thus expresses himself: "Hippocrates laid down a rule, the neglect of which has been the source of many diseases. He says, that a bath enfeebles every time that its heat exceeds that of the body immersed in it. Now, as my house is not more than a league distant from the baths of Hasburg or Schinzacher, I have had every possible opportunity of verifying the Hippocratic precept. The very hot bath of Schinzacher is pernicious to weak and delicate persons, notwithstanding that it strengthens in general those who, in using, follow the above rule. Hence, it happens, that I have often observed spasms of the stomach, and tumefactions, the consequence of them, cured by these means, as also edema of the inferior extremities. Those with the gout have, from an in-

ability to support themselves on their feet, recovered their strength so as to walk with freedom; and, at the baths of Hasburg, I have seen military officers, who, although healed of their wounds, continued weak in those parts, throw away their crutches, and in a short time depart entirely recovered. Hence, also, it often happens, that fluor albus is removed in some females and exasperated in others. These waters have also been found hurtful to rickety children, when used too hot, though they work prodigies when we keep in view what Hippocrates advises." A great number of observations made by Marcard, and confirmed by Franceschi, are in accordance with the precept of the great Father of Medicine, because entirely founded on the most accurate investigations. We learn this much from the passage just quoted, that a bath excessively hot is intolerable to delicate subjects, being a stimulus disproportioned to their exquisite sensibility; and also that it is hurtful in sthenic subjects from the addition of the stimulus of caloric to the action of those powers which induced and maintain the excitement of the system at too exalted a grade.

The few circumstances under which hot baths can be of any utility, demand, at least, a certain degree of inertia on the part of the subject on whom they are tried, which may be either the accompaniment of a phlegmatic or lymphatic temperament, or the consequence of protracted disease, without which they can by no means be tolerated. Fourcroy relates the case of an individual, who, being immersed in a bath of the immoderate heat of 66° degrees of Reaumur (180° of Fahrenheit), fell down apoplectic an hour after. And Buchan acquaints us with the history of a pa-

tient who was seized with paralysis from having used a bath excessively hot. Peter Frank mentions the development of an inflammatory fever followed by the appearance of fourteen abscesses, after the application of such a bath. Venel saw at Balaruc, a sick person sink into a state of fatal debility by remaining too long in a hot bath; and the same author tells us, that, at Cauterets, a Spaniard died of hemorrhage from the same cause. Similar inconveniences and alarming effects are also noticed by Currie, to whom we are indebted for so many useful observations on the different species of baths. We shall soon see, however, that there are particular affections in which, provided the bath exceeds a little the animal heat, it may be productive of beneficial results.

The following experiment, among many others of a similar character, will serve to illustrate the decidedly stimulating effects of a hot bath, and the entire impunity with which a person thus suddenly stimulated may be exposed to a colder medium.

July 18th, 1830.—My pulse regular and giving seventy-eight beats in a minute, at half past twelve I went into a bath at 84° Fahr. The immersion was productive of a decided shock, being unpleasant and attended with a shivering. After two minutes the pulse fell to sixty beats in a minute; after five minutes it was sixty-six. Left the bath, and remained out three minutes, in which time the pulse rose. On a second immersion the pulse after two minutes was at sixty, and so continued. Raised the temperature of the bath to 94°, the pulse gave sixty-two in a minute: at 100°, the pulse rose to seventy-eight: at 106°, it was in two minutes at eighty-four, and in five minutes at a hundred. I now left the bath, with the

skin excessively hot and quite red, face flushed, arteries of the head and neck throbbing, and giddiness; large drops began to form on the face, and I could feel a beginning sweat on the body distinct from the trickling drops of water along the skin. Reduced the temperature of the bath to 84° ; and on immersion in it, the pulse in two minutes fell to eighty beats; and in five minutes was seventy-three: the heat and flush had disappeared, and my feelings were nearly the same as at first. After a quarter of an hour, having come out of the bath and dressed, the pulse was eighty-seven: at three P.M., just before sitting down to dinner, it was seventy-seven.

To those not aware of the readiness with which the living body, when in a state of febrile excitement, whether temporary, as when caused by the hot or vapour bath; or more lasting as in disease—the transition in the above experiment from a bath of 106° to one of 84° would seem hazardous. So far from this being the case, I could at the moment have borne a still further reduction of even twenty degrees more without inconvenience. But the circumstances are different when the stimulus of heat has been continued so long as to produce excessive sweating and indirect debility—then the animal economy would feel sensibly the depressing agency of cold, and suffer accordingly. Still more susceptible to cold is the body after long and fatiguing exercise or labour—the period of excitement produced by the earlier muscular efforts has passed away, and languor and feebleness have succeeded. Cold air and water to the skin and cold drinks to the stomach would at this last juncture all be perilous applications; although in the first period they might not only have been used with

impunity, but even with advantage. Persons whose systems are kept in a state of habitual but moderate excitement by inhabiting a warm climate, have less to fear from the sudden application of cold, than those in more changeable and cooler latitudes; hence, according to Larrey and some other good authorities, the Italian soldiers and those from the south of France suffered less in the dreadful winter retreat from Russia, than the Germans and northern Frenchmen. Under the influence of this moderate but regular excitement, a Neapolitan can swallow, after his promenade, ice cream and iced lemonade in quantities which would kill a German, or an Englishman, who should attempt to imitate him, after having been somewhat exhausted though still much heated by protracted exercise. As I have repeatedly said in this work, and the principle is so important as to justify frequent repetition, it is not the excitement of the animal economy, great heat, thirst, and accelerated circulation, that should make us dread the application of cold to the body, but the languor of debility, cool or cold and moist skin, and slower and feebler circulation which may follow this state. On this same principle we can understand why drunkards should be sufferers from the effects of cold, whether applied by means of air, or water for drink.

During the period of drunken excitement, that of artificial fever induced by the ardent spirit, cold will be borne without inconvenience; but so soon as this period has passed, it is succeeded by one of languor and weakness, and of slower and feebler movements of the animal economy, which is at this juncture more sensible to the depressing agencies of either cold water or cold air; and the person is then more liable, in

winter, to be frost bitten or frozen to death, and in summer, to suffer from spasm and other painful and often fatal effects of drinking cold water. Or if the inebriation go so far as to pass the stage of mere fever and partial insanity, and run into stupor, or what is called being dead drunk, then also has the system less power of resisting the continued operation of cold—its momentary application to the skin as by affusion will serve to rouse a drunken man; but its prolonged application, as when such a person is on the road, during a time of severe frost, will still farther benumb, and often kill. It must be obvious, moreover, that the more frequent the drunken fits, the greater is the final debility of frame and the less the power to resist either cold or any other morbid agent whatever.

Excitement, whether by internal stimuli or external heat, when sustained at a certain pitch, enables the person so excited to bear with impunity the depressing agency of cold---the greater even the excitement, evinced by quickened pulse, hot skin, thirst, and increased activity of the senses, the better will the cold be borne. But let this excitement subside, and then we are in danger; our powers of resistance are no longer the same. Safety therefore will consist in our avoiding that excessive excitement which is sure to be followed by weakness, or, when necessarily subjected to it, to moderate it at the moment, and thus prevent its wearing down our organs. The stimulation of excessive heat from a hot bath will not be succeeded by languor and indisposition to exercise, if we diminish the excitement by means of the cold bath, inhaling cold air, or taking cold drinks into the stomach. The Russian, after receiving a few pailfuls of cold water on his

skin which was previously heated and reddened by the hot or vapour bath, feels refreshed. An American with the prevalent notions about the danger of cold applications, after being heated, might think it necessary to dress immediately after the vapour bath, and to carefully keep away, not only from cold affusions but from cold air. The consequence would be restlessness, headache, throbbing temples, thirst, and most of the symptoms of an ephemeral fever.

Cold in the case of a person thus inordinately heated acts on the heart and blood vessels, and their nerves, in a manner nearly similar to what sleep does on the brain and senses and the voluntary muscles—with this difference, however, that while cold prevents the farther evolution of caloric, as sleep does of nervous power, and thus would seem to accumulate the supply, yet the former also abstracts caloric, and not only rests but weakens the parts concerned, if they are compelled to yield more than their superfluous caloric.

The objection to what may be called this violent exercise of the circulating powers of the heart and blood vessels by hot bathing is, that we cannot well say in advance how far it can be tolerated with impunity, nor to what extent we are to apply subsequently the quieting agency of cold. If this latter be in excess, debility ensues---if not enough, there will remain some feverish excitement. In an estimate, however, of the general effects of the hot bath, we must not overlook the great increase of both pulmonary and cutaneous transpiration which it produces, nor the consequent changes in the state of the skin and lungs distinct from what would follow mere excitement of these parts.

Upon the whole, we may with great propriety cau-

tion the sanguineous, the robust, the plethoric, those with full large heads, and who are inclined to drowsing after any little exertion or after a meal, or who are liable to spitting of blood, or whose skins are acutely sensible to heat in general, to avoid the hot bath. We should probably be still more correct and better understood, if we were to say that persons in health ought never to make use of the hot bath alone, without subsequent refrigeration; nor ought those liable to, or at all suffering under fever, with acute pain, or hemorrhage of any kind, have recourse to it. The hot bath is, on occasions, a useful remedy in the hands of a physician, but it requires great caution in prescribing it, and great discernment as to the circumstances under which it should be used, as well as the duration of the period of each bathing, and the precise temperature of the bath.

The cases to which this remedy is adapted are those of inertia, torpor, sluggish circulation, dry and cold skin with feebleness of muscular movement and a low grade of sensation. But here let us avoid confounding the state of the system naturally feeble and phlegmatic, or worn down by age and protracted disease, with the languor which follows acute inflammation or pressure of blood on the brain causing disinclination to motion, or in the lungs giving rise to slow stertorous breathing or asthmatic panting. In the first class of cases, the hot bath would be serviceable; in the latter prejudicial. In suddenly suspended animation from sun stroke, apoplexy, inhaling noxious gases, or swallowing narcotic poisons, we should do great mischief if we attempted to rouse the system by the stimulus of high heat. The cavities of the body, the brain and lungs, and the heart and liver,

are gorged with blood, all the capillaries are unduly distended at this time. Cold air and cold water are therefore the appropriate remedies, which tend gradually to diminish the diameter of the capillaries: hot air or the hot bath would only augment the already too great vascular distension, and soon drive the parts into mortification. The same result would ensue if this bath were employed locally to a frozen limb, or generally to the body in a state of suspended animation from intense cold. The change from inert to perfect living matter must be accomplished very gradually: first cold water and snow are to be rubbed over the parts frozen, then cool and afterwards tepid water, and if the skin recover its sensibilities but there still prevail much general debility and languid circulation, the warm bath may be used; but in no instance is the hot one to be had recourse to.

A different practice, however, is called for, where there is no apoplectic stupor nor asphyxia; but where at the same time there is such a retardation of function with cold skin and diminished sensibility as to threaten a speedy extinction of life. Instances of this state are found in the bronchitis and pneumonia of old persons, who have been greatly exposed to atmospheric vicissitudes, badly fed and imperfectly clad, and who may at the same time have been intemperate, or in whom the pneumonic attack came on during a fit of intoxication. The skin of such persons will be found dry and cold, the exhaled breath also preternaturally cool, the expression of the face haggard, mind wandering, senses obtuse. Sometimes immediate recourse is had in these cases to stimuli given internally, and on occasions with advantage; but considering the state of the stomachs of such patients, the effect of their

prior habits, and the imperfect manner in which the rest of their system sympathizes with this organ, we cannot always say how far prompt general reaction may ensue on its stimulation, or an increase of the inflammation under which it may have previously laboured. It is here that we derive the best effect from the warm bath and frictions of the extremities; and the sensibility of this surface still failing to be restored, we have recourse to the hot bath and frictions. The thermometer in hand, we gradually increase the temperature of the bath until it begins to display a marked operation on the skin, and through this part on the internal functions, by rousing sensibility and restoring the cutaneous and pulmonary transpiration. The inert state of the skin and its greater induration in old people together with their feebler powers of calorification, justify our employing in these maladies a bath of a higher heat than common. They who, in the congestions of the thoracic or abdominal viscera in this class of persons, should lay much stress on the relief to be obtained by the counter irritation of sinapisms and blisters, will find reason to be disappointed, if these applications be resorted to before the skin has partially recovered its sensibility. And even then their effects will not correspond with the anticipations formed; for in aged persons, irritation of one part of the cutaneous surface is not always, as in young and adult subjects, diffused by continuous sympathy over the whole, and a practitioner may have the mortification of seeing a blister cause inflammation and ulceration of portions of the extremities, with very little accompanying or prior excitement of the system at large.

In situations where a warm or hot bath cannot be

conveniently prepared, a pediluvium of the desired temperature will often be found a good substitute. The exhaustion of the patient not allowing of the use of this, a bladder filled with hot water should be applied to the soles of the feet, especially in the hollows towards the inner ankle, and also along the inside of the legs and thighs, and over the stomach. Bladders filled with warm or hot water, according to the nature of the case and the degree of stimulation required, over the region of the stomach, is one of the best means of restoring vital warmth to a prostrated and torpid system.

Not alone are the old when nearly exanimate by the above diseases restored to life and health by the hot bath. A different class of subjects, the infantile, require at times the same remedy. In some young subjects, there is complete torpor of the whole capillary system, evinced in the coldness of the skin and want of susceptibility to medical agents of the digestive mucous surface—neither emetics nor purgatives in the most enormous doses having any effect; the breath is also cold, and respiration hurried and laboured. The first and most important indication in such a case is to restore the deadened sensibilities; and this is most safely and effectually accomplished by the hot bath continued until there is complete reaction, and restored susceptibilities to other remedial agents. Often the stimulation of the capillary vessels in the bath is such as to cause a copious perspiration from the skin, and exhalation and mucous secretion from the bronchia; and in this way entire relief, at least for the time, is obtained. The chief caution in such cases of *croup*, or even *bronchitis*, is to not let the reaction go too far; but to watch the flushed face and other evidences of

this state, in order then to desist from the use of the bath, and not to make inflammation supervene on the torpor of the membranes. Or if we are afraid that the action of the skin will not be kept up out of the bath, and find that perspiration is not yet copious, we can reduce the temperature of the water from hot to warm, and thus obtain with less risk all the effects desired, and which in a great number of cases can be obtained at once by the use of the *warm* bath alone, as already indicated in the last chapter. One great advantage in the use of this, over internal remedies, is the facility with which we can regulate the activity of the bath, and moderate at once any little excess into which we may have been led by prescribing it too hot. The stimulation of the cutaneous surface brought about by the hot bath, or its full, natural vascularity produced by the warm, and sympathized with by the internal organs and their membranes, is also of a safer character than that effected on the stomach and intestines by medicines directly applied to them, whether for the purposes of vomiting and purging, or as narcotics and tonics. There is less risk of local inflammation and irregular determination, and congestion of blood in the former than the latter.

If, in the diseases of the respiratory apparatus, reaction continue too powerful after the hot bath, and if it is not moderated by a bath of a less reduced temperature, and there is with dry hot skin determination to the head, flushed face and giddiness, or to the lungs with full pulse and hurried breathing, we have a ready resource in the abstraction of blood, either from the arm by the lancet, or from the temples and chest by leeches or cups.

There are cases in which the system is in a short

time so completely depressed by an attack of *cholera morbus*, that the skin, particularly of the extremities, is of an icy coldness, the pulse small and fluttering, features shrunk, and all the symptoms of approaching dissolution present. Here no time is to be lost in applying the diffusible stimulus of even high heat by immersion of the body in a hot bath, to be continued until the collapse has been succeeded by reaction and the commoner phenomena of a febrile exacerbation. This remedy and warm enemata are our chief reliance in that stage of the disease, in which the stomach either rejects whatsoever is swallowed, or displays little sensibility to what it even retains.

Cholera infantum differs from the cholera in adults just noticed, in its being usually ushered in with symptoms of increased action, some fever, and morbid heat of the skin, especially of that covering the abdomen. But in the latter stage of this disease the skin is habitually cold, and either dry or of a clammy moisture, the circulation is feeble and worn down by continued irritation: many of the evidences of gastro-enteritis have disappeared, the tongue being now moist and often together with the mouth covered with aphthæ. The warm bath is here the chief remedy; and it failing to restore the heat and active function of the skin, we may with great propriety resort to hot bathing.

The advantages of the hot bath in certain *chronic affections of the skin* have been recognised by physicians. But great nicety is required in the selection of cases; and no little attention is necessary to see that the skin be not over-stimulated, and a chronic converted into a subacute disease of this organ. For the most part the warm and vapour baths will be found a

safer and more efficacious remedy. In certain indolent herpes, and squamous alterations of the skin, with a morbid thickening of the epidermis, the hot bath is serviceable; more particularly if the subjects of the disease be of a cold, phlegmatic temperament.

The rule of paramount importance to guide us in the selection of this remedy is, that there shall be little activity of the circulation and nearly entire absence of gastric irritation, at any rate of heat or tenderness of this organ, and of thirst, as also of dry and furred tongue. In brief, when the disease is restricted entirely to the skin, without any active sympathy with the heart and stomach, we may push the operation of the warm bath to its maximum degree, or even of the hot bath itself. This is the principle which ought to regulate us in the use of hot bathing in all cases of stiffness and rigidity of the joints, whether the effects of sprains, or of rheumatism and gout. This application is the last of the cures in which cold water was the first; and from which last we pass on to tepid and warm, according to the changes in the disease from swelling heat and throbbing pain of the parts with fever, to mere indolent tumefaction and stiffness, without any febrile action. A powerful means of using the hot bath in these cases of stiffened joints threatening ankylosis, or entire loss of motion, is by douching, or the spout bath, of which I shall speak in the chapter following that on the employment of vapour.

CHAPTER VIII.

*Division of vapour baths—temperature—first effects—these differ according as the whole body is immersed or the head excluded.—Sources of information respecting these baths—not so numerous as the subject would seem to call for.—Dominiceti—his book and great pretensions—later English writers, Sir A. Clark, Dr Blegborough and Dr Gibney—and experiments of Basil Cochran—Marcard's short but useful essay.—The kind of vapour bath to be first spoken of is that from water.—Andria's experience of the natural vapour baths near Naples—mildness and salutary effect of the simple vapour given out from the hot springs—temperature of these vapour baths—curative powers.—Assalini's work on artificial vapour baths—his reference to the earlier physicians who used the remedy—his details of its beneficial effects on the different tissues and systems of the body.—The real *modus operandi* of vapour bathing set forth.—The excellent effects of this kind of bath in cutaneous diseases—old ulcers—tumours and glandular engorgements—stiffness and chronic affections of the joints—chronic derangements of the digestive passages—tetanus—and other muscular rigidi-*

ties—*tedious labour—delirium tremens—suspended animation—close of fevers—and some of the exanthemata—protracted intermittent fever—puerperal peritonitis.*—Complete vapour bath, so that the moisture is also introduced into the lungs—cases in which it is useful.—Temperature of the vapour bath.—Dr D. T. Coxe's account of the efficacy of the remedy in many diseases.—The use of the vapour bath enables a person to bear cold drinks and cold air without injury.—The next division of vapour baths is the dry—simple and medicated.—The former was common among the Romans, and is now general among the Asiatics. Of the second or medicated the most valuable is the sulphur or sulphurous fumigations.—Testimony of its great value by Galés, Assalini, De Carro and others.—Neglect of this and the moist vapour bath by the American physicians—these remedies ought to be attached to every public institution for relieving the sick or for specific charitable purposes, as asylums, &c.—Natural sulphurous bath at St Germano and Solfaterra, near Naples.—Great success attending the practice of Galés at St Louis Hospital in cutaneous diseases, and especially the itch.—Superiority of the apparatus invented and used by Assalini at Naples and elsewhere.—Cases detailed by him.—Temperature of the bath 100° F.—Dr Emerson's cases of the efficacy of the remedy.—Mercurial fumigations.—Dry vapour by burning spirits of wine—apparatus for this purpose—caution in the use of the remedy.—Simple and medicated vapour inhaled into the lungs for various pulmonary diseases—simple aqueous va-

pour or that which has been passed through emollient and sedative substances already spoken of.—The vapour from tar once highly eulogized as a cure for pulmonary consumption.—The vapour of iodine strongly recommended to be inhaled for this disease.—Chlorine used in the same manner.—Imperfect success attending these practices—especial caution in the last, or the introduction of so strong an irritant as chlorine into the lungs.—Various apparatus for using the vapour bath, as well as for the local application of the vapour.

IN discussing the circumstances under which vapour baths are to be used, we must take care not to confound the *laconicum* or dry sudatory of the ancients* with the baths which consist in a moist vapour rising from boiling water or from hot springs. The former acts simply by its heat which excites all the functions; the latter, within certain limits of temperature, possesses powers of a milder and more mixed nature.

The division of vapour baths into *simple* and *medicated* or *compound*, has been already mentioned.† The first are such as consist of merely hot dry air or simple watery vapour; the second, those which hold in solution or suspension, various medicinal substances.

The effects of the sudatory, whether dry or moist, on the animal economy will vary according as the whole body is immersed, or only the trunk, so as to exclude the head and allow of the access of the common atmospheric air for breathing. The partial appli-

* See chap. I. p. 25.

† Chap. III. pp. 88—9.

cation of vapour arising from hot water exerts nearly the same effect as a fomentation of the surface to which it is applied.

The temperature of a simple vapour bath, the product of warm or hot water, will vary from 90° to 150° of Fahrenheit, according to the heat of the water, or the space through which it is allowed to be diffused, and the time which has elapsed since the first formation of the vapour. The heat of a Russian vapour bath is commonly from 122° to 133° Fahr. That for which the people of the north are indebted to art is prepared by Nature herself in many places, by means of vapours which issue from hot mineral springs, as at Aix la Chapelle, Baden, Balaruc, Burscheid, Pfeffler, Plombieres, Lucca, Island of Ischia, &c.

When the whole body, or only part of it, the head being free, is surrounded with vapour exceeding the animal temperature, a portion of the water thus elevated and suspended by caloric, is introduced into the system through the absorbent vessels, and the remainder, losing part of its caloric by contact with a body of a lower temperature, is condensed into drops which trickle down the skin. After a while, the heat is diffused over the entire surface, whence even the most remote parts become red and covered with a profuse sweat. And here it is worthy of remark, that the avidity of the absorbents in seizing the watery vapour is so great at the commencement that they take it all up; nor does it flow on the body until the vessels themselves are entirely filled, as was remarked by the celebrated Mascagni and Franceschi, when the former made use of the vapour baths established by the latter at the Lucchese *thermæ*.

If the head be also exposed to the vapour so that

this latter is inhaled, the stimulating effects of the bath are increased, and the amount of fluid absorbed very greatly augmented. The distension of the pulmonary capillaries is considerable, and so far serves to moderate the hurried respiration which the caloric of the vapour naturally tends to produce. This increased fulness of the cutaneous and pulmonary capillaries, accompanied also by increased exhalation, is not without its effect on the circulation; the pulse acquires volume with some additional frequency; the brain participating by its membranes in the state of the lungs and skin is fuller of blood than usual, and there is a tendency to sleep, or at least a general feeling of languor and indisposition to bodily exercise.

The above description is presumed to be characteristic of the effect of vapour at a few degrees, eight or ten, above animal heat, and in which the body has not been long immersed.

The contributions to our knowledge of the remedial effect of vapour baths have not been as numerous and diversified as we had a right to expect, from the spirit of inquiry and experiment among the physicians of middle Europe and the United States. The ancient Romans seem to have chiefly used their sudatories, whether dry or moist, as a means of luxurious enjoyment, and perhaps more with a view to its preventive powers than with any very rational notion of its being calculated to cure diseases. Celsus indeed praises the sudatory in dropsy; but the directions for its use are not very clear or precise. In northern Europe the people, among whom the vapour bath has been in habitual and extensive use, have not been remarkable for their additions to the general stock of either professional or scientific information; and what we know of the matter

in question has chiefly been communicated by strangers. In southern Europe, and especially in Naples and Sicily, where vapour baths, both moist and dry, have always been in use, because always readily provided by the hot springs of the volcanic soil of those countries, we might have expected more satisfactory details: but these, though not entirely wanting, are not of that precise and definite nature which one could desire in such a matter. The physicians of Great Britain, France, and Germany, who have so largely contributed to swell the stock of medical lore and practical medicine, have done comparatively little towards enlightening us on the therapeutical value of vapour.

About fifty years ago the attention of the English public was directed to the subject by Dominiceti, a man of some enterprise, not deficient in ingenuity and medical information, but an insufferable boaster, and withal querulous and pragmatical. He wrote a book of nearly six hundred pages octavo, entitled "*Medical Anecdotes of the last thirty years, illustrated with Medical Truths, and addressed to the Medical Faculty; but in an especial Manner to the People at large; with an Appendix and copious Index.*" The real object of this work was to set forth his wonderful cures, by what he was pleased to call his "arbitrarily medicated and heated water and vapour baths, fumigations, and frictions." He would seem to have united in himself the various powers, and invented the means of cure, which, in later times have been divided among panacea manufacturers, steam doctors, and natural bone setters. Throughout his whole book one looks in vain for a detailed account of his various apparatus for bathing, and a rational exposition of the circumstances under which

his boasted remedies are to be used. Of his singular modesty the following, entitled "Observation," duly emphasised by Italics, on the methods of cure recommended by some authors of repute, will serve as no bad specimen. Time has not added so much in this line to the boastful slang of quackery. After admitting that the most eminent physicians, both ancient and modern, were convinced of the utility of stoves and fumigations, he continues in the following strain:

"Nevertheless it appears from their own words, faithfully quoted, that the methods they employed *in the practice* of such operations were irrational, absurd, founded on the grossest ignorance, and calculated rather to harass, torment, and, I wish I could not add, even *destroy*, the patient, than to procure to him *a sure and permanent relief* from his complaints. Before the happy introduction and establishment of my inventions, there was not a physician or surgeon in Europe who had formed the most remote conception of my salutary modes and means of not only preparing moist and dry *fumigations*, and of applying them with ease and safety, whether unitedly or separately, whether internally or externally, whether partially or universally, but of preparing also—what are essentially requisite to obtain from *fumigations the grand end proposed*, and what, *till then*, they were equally ignorant of—arbitrarily-medicated and heated water baths, and vapourous and dry baths, and of administering them in the like manner either unitedly or separately, according to the disorder, the constitution, and the vital heat of the patient, the state of the atmosphere, and other critical circumstances; so as not only, as Hippocrates teaches us, *to retrench* from the animal frame, through the pores of

the skin, what is *redundant*, but to supply the body, by means of the absorbent vessels, with what is *deficient*.”

But in justice to Dominiceti it ought to be stated, that however backward in describing his establishment in his book, he was willing enough to show it to all inquiring visitors. Perhaps he made his main secret to consist in the medicated substances which were added to the different kinds of baths, and which he did not feel himself called upon to divulge. With a vanity not unnatural for a man in his peculiar situation—a foreigner, and suspecting that he was suspected of charlatanry, he informs the reader of the number of distinguished persons who visited his establishment, indicating by particular marks those who honoured his table, those who had been under his care, and those who only examined his apparatus. Among the cards sent to him is one containing among many other names that of Benjamin Franklin, L.L.D. There must have been a good deal of naiveté about the Venetian doctor to think it such high honour for nobles and honourables, foreign and English, to occasionally dine with him; as if a man who keeps a good table and open doors should ever want guests of quality, whether they be royalists or republicans. We could perhaps give an instance near home of literary and professional men extending their patronage to a quack of the true Bœotian stock, and yet in whom, on the strength of his fine establishments and costly entertainments, they discover various merits, even to the possession of an inventive faculty.

In reply to the complaints of the backwardness of Dominiceti to explain his apparatus in his book, the reader might perhaps cite the following as ample spe-

cification. It certainly promises enough. If the projectors and builders of hospitals and alms houses can accomplish half as much as is here alleged to have been done by means of a single fire, we invoke them in the name of humanity to set about the task forthwith.

“To convey an idea to those who have not had an opportunity to witness the amazing powers of my apparatus, as I had the honour to display them to my illustrious guests above mentioned, I must observe among its other economical and salutary properties:

“First: That thereby, with the assistance of *such a fire* as is commonly used in the kitchen of a private family to boil or roast a single joint of meat, a dinner of three courses may be dressed, and bread baked for one hundred people, with the utmost ease.

“Secondly: That *at the same time* it renders either *putrid* or *salt water* sweet, and in a sufficient quantity to supply a ship's company, as it distils without interruption at the rate of *one pint* in *one minute*.

“Thirdly: That *at the same time* it also not only prepares the medicinal effluvia of vegetables and mineral substances unitedly with, or separately from, the salubrious dry fumes of gums, balsams, and minerals, so as to be *instantaneously* conveyed to several vapour baths, and to more than *thirty rooms*, built for the use of the sick and infirm; but applies them *effectually*, by means of various machines invented by me for that purpose, to the whole or to any part of the body; and, when required, introduces them also with the utmost decency and safety, by the help of my pliable catheters, into the urethra, bladder, or anus, with every different degree of heat

and species of medicinal substance, which the complaint may demand; and all this, notwithstanding the bed-chamber of the patient is *at two hundred or more feet from the aforesaid little fire.*

“Lastly: That *with the same fire, and at the same time, more than thirty bed-chambers* may be thoroughly warmed, and in each, *without any additional fire, the linen and woollen garments may be dried, and any quantity of water kept boiling,* for whatever purpose may be required. In a word, it so far surpasses conception, that no judgment can be formed of the extensive utility, with which it might be employed, particularly *in ships of war, garrisons, hospitals, and lazarettoes,* without actually seeing the apparatus itself.

“In either of these, with a common kitchen fire, or with any other fire, however distant, if it be sufficient to boil a single gallon of water, whether salt or putrid, not only such water is made fresh and potable, but any number of soldiers, sailors, or prisoners, may be preserved from fevers and other contagious distempers; and at the same time, by the volatile effluvia and dry fumes of cephalic herbs and gums, the spirits may be revived and comforted. If either of the above maladies hath already made its appearance, it presents likewise an easy and effectual remedy. It is farther to be observed, that by means thereof ships of war, barracks, hospitals, &c. may be exempted from all sorts of vermin, and from the fatal effects of bad air, pestilential infection, and poisonous effluvia.”

I should not have thought it necessary to engage in these details, were it not to show that Dominiceti, himself a borrower, has been in his turn imitated after nearly half a century by quacks of all degrees. First

is that original teacher of botany by transparencies, for the love of science, and the eulogist and self styled inventor of medicated vapour baths* “for the benefit of the whole human family” as he says in his broad Doric accent, that he once told the duke of York.

With a centesimal part of Dominiceti’s medical knowledge, and we do not mean to rate his very highly, are certain itinerants of the present day ‘steam doctors’, who go about our country, vexing, first the people’s ears with strange jargon, and next their stomachs with cayenne, and skins with hot vapour. The botanical school itself, as some millenium herbalists call themselves, and who cannot see safety in any mineral, nor poison in any vegetable, could not hold the surgeon’s knife in much greater dread than did Dominiceti.

If we ever have any doubts about the real nature of a quack’s pretensions to discoveries and improvements in the healing art during his life time or in the period of his successful career, the question is completely solved by his death, or after his declining business or business him—all his boasted inventions die with him—his ready impudence is not a direct transferable matter, and he cannot will to friends or successors the precise amount of the credulity of the public, which had been his chief stock in trade. How different the real discoveries of genius. They may not at the moment be fully appreciated, but they are not forgotten; the discoverer invites attention and inquiry, and puts in the power of others to improve on his own suggestions, and to make them public property. Measured by this standard we shall not be disposed to estimate very highly the boasted inventions of Dominiceti, which seem to have consisted in the application of

* Whitlaw, who honoured these United States with visits in both capacities.

vapour generally or partially and of douching, followed by frictions, in imitation of the practice pursued by his countrymen in different parts of Italy. His personal industry gave his practice some vogue; but, unsupported by the principles which he so pompously announced as its basis in his work, it was not kept up with any spirit after his death. Indeed it would seem that here, as in some other instances of quackery, boastful promises and lying asseverations indispose the quiet and reflecting from continuing a practice which they see associated with, and made the vehicle of so much moral turpitude.

Of later years the attention of the English physicians has been directed to the subject by the writings of Sir A. Clark, Dr Blegborough and Dr Gibney, and the experience of Basil Cochrane and others, with, we hope, beneficial results. The Turkish practice of the vapour bath, and shampooing, have also been made fashionable at Brighton, under the direction, perhaps we ought to say the hands, of a certain Mahmoud, whether a real Turk or renegade we are not very positively told, nor is it a matter of any vast moment.

Contrasted with the boasting of the Venitian Dominetti, who prefaced his books by a certificate from the herald's office, of his family having been ennobled by one of the German emperors, is the brief and modest notice of vapour baths by Marcard, at first in a separate essay, and afterwards in his valuable work on "The Nature and Use of Baths." He acknowledges, however, that his experience is limited to the partial application of vapour, or at least to that kind of bathing in which the head is external to the bath.

In what I have to proffer on the remedial effects of this kind of bath, I must be understood as speaking, first of aqueous vapour, and next of dry and medicated,

including certain gases. The best illustrations which can be furnished of the former of these two varieties, or the aqueous vapour bath, are obtained from a study of the effects on the animal economy of the watery vapour disengaged from hot springs, and confined in apartments constructed for the purpose, or in such a way as to admit of its being applied to particular parts of the body. The number of thermal springs in the vicinity of Naples, especially in the island of Ischia, and the great number of patients who resort to them, have enabled the physicians of that city to collect valuable information on the subject. Andria, in the second part of his work,* gives a detailed description of the locality of the different hot springs, and also of the natural vapour baths (*stufe*) of the island of Ischia. The volcanic character of the island, and the mineral matters, the product of volcanic action so abundantly found there, led to a belief, for a long time accredited by physicians, and still entertained by the vulgar, that the vapour given out from the crevices of the rocks and natural grottoes, held in solution sulphur and sulphuret of mercury (cinnabar); and hence according to this opinion the good effects of these *stufe* in various diseases. Andria dispelled these illusions, and showed by experiments that the vapour, was simply water elevated by the extreme subterranean heat. He selected, as more particularly the subject of his observations, the *stufa* of San Lorenzo, the temperature of the vapour of which is 124° of Fahrenheit. Flame was not altered by it, nor was respiration impeded; small animals confined in the fissures from which the vapour escaped, did not suffer in the least; the leaves of the few plants in the spot was not at all dis-

* *Trattato delle acque Minerali.* Napoli.

coloured, nor their growth stunted; introduction of the head with the eyes kept open was not attended with any irritation; no peculiar odour was experienced; no incrustation was formed on the sides of the fissures or walls of the rooms in which the vapour was received; nor was the lustre of metals altered by exposure to it unless from humidity, nor any change produced on various chemical reagents.

The temperature of the different natural vapour baths of the island of Ischia are as follows: The *Stufa* of *San Lorenzo* is 124° Fahr.; that of *Castiglione* 133°; of *Cacciotti* 156°; of *Citara* 167°. One alone, the *stufa* of Testaccio, was of simple hot air of the temperature of 111°.

At these *stufes*, there are in addition to the regular rooms for entire bathing, boxes and various openings so made as to allow of the application of vapour to a particular portion of the body, as for a seat or hip bath, or a box to inclose a joint, &c.

The poor from the hospitals of Naples, whose diseases seem to require such a remedy, are sent to the island of Ischia, and the means supplied to them of making use of warm, hot, and vapour baths. Such an arrangement is highly creditable to a government which for the most part does little to elicit eulogy. As medical agents, the vapour baths of Ischia are declared by Andria to be useful for softening the skin and resolving lymphatic engorgements, and promoting perspiration: they gently stimulate the nervous and muscular systems, and remove indurations and concretions in the locomotive apparatus generally, especially about the joints; and of course are beneficial in gouty and rheumatic diseases of a chronic character and in stiffness and incipient ankylosis, sometimes the consequence of these diseases: chronic catarrhs, and

affections of the mucous system generally, will be greatly benefited by vapour bathing.

Andria prefers the stufa of San Lorenzo to the others, and thinks that on account of its more moderate heat it is better adapted to ensure the good effects just indicated. He cautions against subjecting those naturally feeble or become so by age or adventitious causes to the vapour bath of a high heat—but on this point he speaks with the same vagueness which marks the language of most writers on bathing. Feebleness, associated with irritative fever, sub-acute or acute phlegmasia and great nervous susceptibility, constitutes a state of the system in which high heat, whether conveyed by vapour or water, could not well fail to be prejudicial. But that feebleness, associated with an anemic temperament, pale and cold skin, flabby flesh, slow circulation and little sensibility, or when it has resulted from protracted disease, fever or inflammation, which have subsided and left the organs weak and languid, with partial engorgements or tumefaction, then will vapour baths of an elevated temperature be not only well borne but very serviceable.

Near the shore of the bay of Baia are the baths of *Tritoli*, or of *Nero*, as they are called by the Ciceronis. The Romans had erected on this spot a large edifice consisting of numerous rooms, into which the vapour from the spring beneath was conducted by appropriate tubes: all of which are in ruins. The only accessible passage to the hot spring now communicates directly with the open air: it is long and narrow, and filled as it is with hot vapour, offers no little obstruction to a person who should desire to traverse it. With more curiosity than prudence I accompanied the guide to the spring. It is customary for

him to go down to it and bring up a bucket full of its water, in which, in order to show its high heat, an egg is thrown and cooked. The heat was very oppressive, and it was with great difficulty that by following the guide's direction to stoop, and thus breathe the air least heated and oppressive, I was enabled to persevere in bearing him company. This kind of extemporaneous vapour bathing produced in me for the next twenty-four hours a feeling of languor and pain in the limbs and head, no doubt increased by the exposure to the sun in our boating excursion round the bay of Naples and a visit to Ischia, Procida, and Capri. The heat of the water at the *Tritoli* spring is stated to be 167° Fahrenheit.

In the neighbourhood of Pozzuoli and within a few miles of Naples, are the thermal springs of Pisciarelli, or, as they are called in general, of Solfaterra; from which issue abundant watery and sulphurous vapours, which might, with little trouble, be introduced and retained in appropriate chambers. The heat of the Pisciarelli water at one of its sources is 167° Fahrenheit. In Pozzuoli itself there are several thermal springs: the highest temperature is of that of the temple of Serapis, being from 102° to 106° Fahr. We may reasonably presume that the ancient occupants of this temple, the priests, knew how to turn to account the curative properties of these springs in favour of their assumed power of working miraculous cures, by promised intercession with their presiding deity, Jupiter Serapis.

Among Italian writers and physicians, Assalini is the one who has most fully investigated the effects of all the varieties of vapour bathing by artificial processes and apparatus, many of which are of his own

invention. When a resident in Munich he introduced into common use portable vapour baths: but it was after he made Naples his home, that he enlarged the sphere of his experiments and inquiries; and gave them to the public in a work* professedly on the subject.

In the preliminary chapter, Hippocrates is mentioned as frequently recommending fumigations—sometimes simple watery vapour—sometimes the vapour of vinegar: on occasions he used various gum resins, and at others emollient herbs, through which the vapour from water was made to pass, and the peculiar qualities of which it was presumed to keep suspended. Many other medical writers of a subsequent date are also mentioned, and among others Aretæus, who distinctly describes as the best, the method by which the patient has his head out, and breathes the common air, whilst the rest of the body is exposed to the vapour. Gaubius speaks of fumigating boxes or domestic vapour baths, in which the whole body, naked, was inclosed, except the head. Boerhaave had recommended, long before Mudge introduced his inhaler to the notice of the profession, the employment in pulmonary catarrh of the vapour of water distilled over elder flowers. Assalini tells of his having many years ago heard Peter Frank recommend in his lectures sulphur fumigations for the itch. For the full application of this variety of vapour bathing, we are, however, more indebted to M. Galès, apothecary of the St Louis hospital, than to any other person.

* *Ricerche Mediche su i Bagni a Vapora e di Calorico e sulle Fumigazioni di Sostanze Ammoniacali e Balsamiche, di Zolfo, di Mercurio, &c. &c.* Del Dott. Paolo Assalini. Napoli, Tom. I. 1820.

Assalini treats both of the effects of simple watery vapour, and of dry heat and fumigations. By means of vapour prudently directed we can, he thinks, accomplish much in the healing art.

His details on this head are rather of a contradictory nature, but may be in a measure explained by the somewhat opposite action of the caloric and the moisture in the vapour; the first being a stimulant, the latter soothing and sedative. Where the dose of the caloric is not great, its stimulating action will be mitigated by the influence of the moisture, which may even predominate and give rise to soothing and sedative effects. Thus the aqueous portion of vapour applied to the epidermis or outer scarf skin penetrates and softens it more completely than simple immersion in warm water would do. This very softening of the hard and resisting cuticle and epidermis, and also of the dermoid tissue, allows of a greater expansion of the vessels of the skin proper, and diminishes in consequence the state of tension to which the nervous papillæ might have been subjected. The simple watery fluid condensed on the skin or penetrating the epidermis is also largely absorbed, and by its mildness and blandness is an agreeable diluent of the more stimulating fluid which may have been in the vessels previously: the nerves also are pleasantly affected, as in the instance of the warm bath, by this mild vapour applied to their extremities. Hence we can understand how, even although the caloric of the vapour should invite a greater afflux of blood and fluids to the minute vessels of the skin, the entire effects of this kind of bath should be of a soothing and sedative rather than stimulating or irritating character. But we must also take into

account at this time the increased secretion from the skin in the form of sweat, and which, when not excessive, is often salutary. It is not so much, however, by simply restoring and exciting perspiration that this remedy is so serviceable, as by its restoring the due proportion between the secreting and absorbent vessels—accelerating their circle of functions, and without undue heat or excitation causing a renewal, as it were, of the cutaneous system; that is, of the tissues which compose it. Hence the old cuticle, after the regular use of the vapour bath, peels off, and new is formed; the complexion and colour of the skin are improved by the removal of the darker and discoloured pigment or *rete mucosum*, and the substitution of a new deposit. The inert and partially collapsed capillary vessels of the skin acquire more vitality and fullness from the afflux of blood to them, in consequence of the heat of the vapour, and they are more ready to supply the secretion of sweat, while at the same time there is a large imbibition of moisture, and consequently augmented size of the lymphatic and venous absorbents—two conditions, fullness of the arterial capillaries by afflux of blood, and fullness of the absorbents by the watery fluid introduced, which give a plumpness and roundness to the skin and cellular tissue, observed in those who have just left the bath.

The foregoing sketch will enable us to appreciate the hygienic operation of the vapour bath on the skin, and through this latter on the animal economy in general. The higher the heat the more decidedly stimulating will be the vapour—and of course the greater will be the cutaneous excitement and duration of the heat of the system, even to the extent of simulating a febrile paroxysm. Nearly analogous effects to those

produced by the moist vapour bath will ensue on exposure to a dry vapour, or air of a room heated by flues, as in the Asiatic baths; and the application subsequently to the skin of water, either by affusion or by aspersion and sponging.

Assalini gives, in his work, a detailed description and drawing of his movable vapour baths (*stufe*) and of the various contrivances by which the vapour is directed to a particular part, as on the head, into the ears, nostrils, fauces, &c.

Among the first of the good effects which he attributes to the remedy in question is restoring suppressed perspiration—a desideratum in many maladies often attempted by stimulating diaphoretics, all of which more or less affect the stomach, often unpleasantly and morbidly.

The next general effect of vapour medically applied is, according to Assalini, the softening of the cutaneous tissue and relaxation of inflamed parts. In such cases, he tells us, that, if we cause evaporation from water below animal heat, or about 90° Fahrenheit, the vapour applied on the affected part and gradually absorbing its caloric, will become emollient and relaxing. For accomplishing this end he sometimes used sulphurous waters; at other times simple water with althea or mallows, or poppies, or the like emollient and sedative matters infused in it. The vapour thence evolved was applied, by means of his apparatus, to the fauces in *angina*, to the nostrils in *coryza*, to the eyes in *ophthalmia*, the ears in *otitis*, to the teeth in *odontitis*, to the lungs in *pneumonia*, to the breasts in *inflammation of those parts*, to the abdomen in *flatulent and rheumatic cholic*, and to the uterus in *irritation and inflammation of that or-*

gan: thus advantageously substituting this remedy for common bathing, fomentations with flannels and the like, and cataplasms of various kinds.

He has found this practice of vapour bathing of the part very valuable in discussing engorged mammæ, in milk fever and chronic diseases of these glands. Semicupia of vapour, that is baths for the lower extremities, are extolled by him in abdominal and other affections following cold and wet feet, such as suppression of the lochia, menses, &c.

In admitting, with Assalini, the sedative effects of vapour baths at a low temperature, and the consequent usefulness of the remedy in morbid sensibility and irregular and spasmodic movements of the limbs, we may be allowed to doubt whether its efficacy is as greatly increased as he intimates it to be by the addition to the water of what are called various antispasmodic substances, such as camphor, asafetida, oil of amber, camphor and empyreumatic oils. The very minute proportion of such matters volatilized by vapour of a low temperature, and the limited absorption by the skin would prevent us from anticipating much from their use in this way, at least so long as the vapour is applied to the skin alone.

In cutaneous diseases the remedy in question is unquestionably of great value. The cases in which its efficacy is most marked are those of sanguine temperaments with dry and squamous herpes---the same in which emollient fomentations by decoctions of marsh mallow or flaxseed are found so successful. Persons with more sluggish circulation and phlegmatic habit, and in whom an ichorous discharge accompanies the eruption, find great benefit from dry or sulphurous fumigations.

Generally speaking, whatever keeps up or causes a dry and parched skin, will be apt to bring on or cause a return of herpetic eruptions, tetter, and the like; and hence the occasional use of the warm and vapour bath is an excellent preventive in habits peculiarly predisposed to such relapses, as well as an admirable auxiliary to other remedies, when such are thought necessary during the existence of the disease itself.

Among the various domestic prescriptions given for the purpose of preserving a due degree of softness and pliancy of the skin, there are few if any equal to that favourite of the ladies, cold cream. Exception might perhaps be made in favour of the more homely flaxseed mucilage, made by boiling flaxseed in water until the fluid has a semi-gelatinous consistence. Were either of these cheap and readily obtained cosmetics to be used, to the entire exclusion of the oils, powders, washes, and pigments recommended with such unblushing effrontery to remedy roughness and eruption of the skin, we should have more smooth faces, better complexions, and what is of still more consequence, not hear or read so frequently of dyspepsia, diseased liver, consumption, affections of the heart, dropsy, and insanity itself, severally coming on after cutaneous eruptions injudiciously repelled.

The following case of obstinate disease of the skin cured by the vapour bath will set this remedy if possible in a still more advantageous point of view. It is related by Curzio, a Neapolitan physician, in a letter to the celebrated abbé Nollet.* A young woman seventeen years of age, who had never menstruated, had such induration and stiffness of the skin that it

* Journal des Savans. December 1775.

was like leather, or rather hard almost as wood. The neck was the part first attacked, then the face, and finally the whole body. Even the lips and tongue were stiffened. The skin had not, however, lost its sensibility; the edge of the nail or point of a needle caused great pain. A singular circumstance mentioned by the author, and by him attributed to the defect of transpiration, was that the urine greatly exceeded the quantity of fluid drank; but one is at a loss to see how the suppression of customary secretions should actually increase the quantity of fluids in the system. The explanation of the fact must be found in the excess of pulmonary absorption, since it is difficult to suppose that there was even the customary activity of this function in the skin. With the exception of this peculiarity the young woman made no complaint.

The treatment was directed to softening the skin, and the first remedy employed with this view was a fresh water bath, of a temperature not mentioned; but we are led from the context to suppose that it was warm. The patient could not bear it more than half an hour at a time, and it seemed as if it caused greater contraction of the skin than before. After the seventh bath, finding the disease grow worse, the physician imagined that if he could prevent the pressure caused by the water, the moisture would still be serviceable. He accordingly had recourse to the vapour bath; after the sixth application of which there was a little perspiration under the arm pits, on the chest, and hollow of the ham. This effect went on gradually increasing until the skin became less rough to the touch, though it was still very hard. After twenty baths, there was continual sweat, and at length the skin of the thighs regained its suppleness, then that of the legs; and

after five months treatment, which consisted of the internal use of mercury, the patient was entirely restored to health.

Assalini very properly insists on constant attention to the state of the sanguiferous system, in herpetic eruptions. Sometimes there is general plethora, at other times it is local or cutaneous. The abuse of warm and hot baths; in the quantity of clothing, and of ardent spirits, increases in a more peculiar manner the latter kind, and gives rise to extensive furuncula and numerous pustular herpes, chiefly on the forehead, arms, shoulders, and perineum. The varieties in the cutaneous tissue in different regions cause corresponding differences in the eruptions of the part. The odour of the secretion from the skin of the feet is different from that of the trunk, and both again vary from that of the arm pits. The practical inferences from this observation is, that as these eruptions are often merely local and are maintained by a supply of blood directed to the skin, equal in purity to what is the pabulum of healthy secretions elsewhere, we are not therefore to look always for internal disease connected with general impurity of blood as the cause, nor have recourse always to internal and general remedies, but we may at once remove the local irritation by the vapour bath or analogous applications.

Syphilitic eruptions and ulcers are greatly benefited by the moist vapour, alone, or in alternation with sulphurous and mercurial fumigations. Assalini furnishes instances of very obstinate affections of this nature cured by simple moist vapour, or medicated with emollient and sedative substances.

The good effect of the vapour bath in these as well as in numerous other morbid states of the animal

economy has been attributed to the free perspiration and, in this respect, the restored function of the skin, after it has been suppressed. This opinion has been supported by reference to the fact of a stoppage of cutaneous transpiration by exposure to cold and moisture being followed by numerous maladies; catarrh, rheumatism, pleurisy, and inflammation of the lungs and other organs, fevers of various kinds, intermittent, puerperal, &c. Additional evidence is supposed to be furnished in the condition of the skin during many chronic maladies, in which it remains dry and rough.

The admission of these facts does not, however, by any means pledge us to a belief in their bearing this connexion with each other. Suppressed perspiration and otherwise disturbed function of the skin are often the effect of prior derangement of the internal organs; and the restoration of the former is also often subsequent to, rather than the cause of, the removal of the latter. Nor is a belief in the revulsive operation of the vapour bath, and its thus relieving the system from pain, inflammation and fever, by derivation of blood from those organs, borne out by the phenomena which are evinced after its application. Countenance may seem to be given to this idea by the manifest relief which follows restored eruptions of the skin, either of an acute character, as in measles, or chronic, as of herpes; also by the diminished discharges from internal surfaces, as in diarrhoea, after the skin has been excited and its capillaries filled by the action of warm clothing, frictions, and the warm and vapour bath. But this explanation cannot apply to cases of constipation relieved, torpid liver made to secrete bile, and the uterus menses, after the skin has been

rendered soft and made to pour out freely perspirable matter. Here the increased discharge from the organs and surfaces internally is consentaneous and synchronous with increased discharge from the skin and additional excitement of this organ.

The manner in which the vapour bath and analogous remedies, such as the warm and hot bath, for either of these may be compared to the former according to the degree of heat to which it is raised, would seem to be explicable by direct sympathy between the skin and all the internal organs. The moderate augmentation in caliber, and medium state of sensibility in which the vessels and nerves of the skin are placed by the bath, is directly participated in by the vessels and nerves of the mucous lining of the lungs and of the stomach and intestines, as well as by the expanded tissue of the white membranes, serous and fibrous, and the secreting vessels, or the parts instrumental in the secreting function of the glands, liver, pancreas, mammae, &c.

Mere derivation of blood would fail to give entire relief, however we might excite and redden the skin; sweating, however profuse, as where a paroxysm of fever or of violent pain ends in this way will not suffice to remove the disease. It is not the mere amount of blood in the skin and its subjacent tissue, nor the mere sweat that is sufficient to relieve the internal organs from their state of irritation or inflammation. The benefits are gained, not only by inducing that action of the skin by which its natural functions are restored and maintained, but also by inducing a similar consentaneous action in all the internal membranes and secreting apparatus. When a vapour bath cures ichorous discharges from the skin, and chronic ulcers

of the same part, we cannot explain the effect thus produced by any principle of derivation or counter-irritation. Neither ought we to attempt a similar solution of the problem when the internal sero-mucous discharges from the bowels are increased by this remedy. In both cases the cure depends, not on an afflux of fluids to one part and their minor quantity in another, but on altered condition of the tissues themselves, brought about by impressions which modify their sensibility and the mode in which the minute vessels dispose of their contained fluids. On the skin the impression is immediate; on the internal surface secondary and mediate. The kind of action is the same in both.

I feel myself the more called upon to expose the fallacy of the common theory of the *modus operandi* of all the varieties of baths, on account of the injurious influence which it has exerted on practice. Both physicians and the people at large seemed to have little other idea of baths of various temperatures than as means of driving away the blood when in excess, from the surface, or of drawing this fluid out to the skin from the internal organs; or of constraining or relaxing fibres. Morbid or peccant humours supposed to be evinced on the skin by eruptions were also presumed at times to be driven inwards, to cause all the danger and distress following their disappearance. It was forgotten that there could not well be such a sudden transfer of these humours from the minute vascular net work of the skin to the internal organs, such as the stomach, heart, and brain, and necessarily often as speedy a return to the skin, without the blood in the circulation being in the mean time affected or tainted—a change which we are certain it does not undergo. When external

heat by the warm or vapour bath restores the eruption on the skin, it is not by withdrawing from the inward parts by a kind of fermentation or coction, peccant humours, but simply by so altering the condition of the cutaneous tissue that the dilatation of the capillaries and partial extravasation of their fluid causes the discolouration and spots diagnostic of the eruption. The same effect, as well as the bringing on of perspiration, has been caused by cold air and cold water applied to the skin, when this part had been preternaturally excited and its heat morbidly great. There is not, therefore, any specific power in cold or in warm water, or vapour, either to repel or attract blood and humours, and to drive them in or fix them externally.

The guides to regulate us in the use of baths generally are the temperature and sensibility of the skin, and the ranges of sympathies between it and other parts. The sedation by a cold, excitation by a hot, equable action by a warm, and increased nutritive activity in absorption and exhalation by a vapour bath, which are undergone by the skin, are all severally participated in by the internal membranes---mucous, serous, synovial, and fibrous, and by the glandular and other viscera, with the modifications growing out of their peculiar tissue. As far as the nervous expansions blended with capillaries, red and white, and absorbents, secretors, and exhalants are concerned, the kind of action to which all these parts are subjected by bathing is the same in all; the difference is merely in mode or degree. The measure in these cases can never be furnished by an arbitrary estimation of the amount of fluids driven from the surface on one occasion; or drawn to it on another, as if the skin on one side and the internal

organs on another represented two sides of a hydraulic machine, the fluid in which was driven backwards and forwards by countervailing forces. Equally erroneous would be the supposition that baths operate on the system as they would on a piece of dead fibre or leather—by constringing and relaxing, approximating parts and separating them. All these are notions derived from physics and the laws of dead and inorganic matter; and ought not to find countenance with any intelligent physician. They have served no other purpose than to favour the rankest empiricism, and to retard our knowledge of agents of great power, and, under proper management, of unquestionable utility.

Let us, returning from this digression, resume the notice of those diseases in which the vapour bath proves beneficial.

Tumefactions of the lymphatic glands, especially those of a scrofulous nature, along the neck, have been discussed by the vapour from salt water. Assalini, who speaks of this kind of treatment, does not seem to be aware that the vapour thus arising is simple moisture which has no marine salt in solution. If condensed, as in the process of distillation, it would furnish fresh water.

In those troublesome and painful affections of the joints, whether chronic gout or rheumatism, or having their origin in syphilis or the excessive use of mercury, the vapour bath is a valuable remedy.

Chronic glandular inflammations, as of the liver and pancreas, and tumefactions of the spleen, are often greatly relieved and at times completely cured by the remedy in question. It merits the same praise in chronic affections of the digestive passages, as in pro-

tracted diarrhoea and dysentery, and certain cases of dyspepsia, the more especially if friction be freely employed after the bath.

Dr Marsh, in the Dublin Hospital Reports, Vol. IV, states his having employed this remedy in *tetanus* with success. Of three cases subjected to the vapour bath of a low temperature, 90° Fahrenheit, two recovered. In one of these, calomel and opium, in succession, had failed to produce any effect; and in the other ptyalism, induced by the two medicines conjoined, failed to mitigate the disease. These were the two recovered cases. In the first croton oil internally, and belladonna and oil of amber along the spine, were used at the same time with the vapour bath. The patients were kept in it four and even eight hours at a time.

This remedy is of marked efficacy in various cases of muscular rigidity. On this account it has been successfully employed in tedious labours. In *Delirium tremens*, in which the skin is often so cold and its capillaries torpid, we cannot doubt but that the vapour bath would display good effects similar to those which Dr Wright of Baltimore obtained from the warm bath in this disease.*

Both Chaussier and Sir A. Clarke recommend the vapour bath in cases of suspended animation; and considering the direct sympathy between the cutaneous and pulmonary capillary system, we can hardly doubt that the moderate excitement imparted by the proposed means to the former would be transmitted to the latter, to say nothing of the stimulus of heat applied thereby to the nervous or sentient expansion on the skin, and through it to the nervous system

* American Journal of Medical Science.

at large. Sir A. Clarke and Dr Gibney also seem to prefer the dry vapour heated by a spirits of wine lamp, and conveyed through a suitable tube. This plan has been adopted by the humane societies in England: but long after a nearly analogous one had been practised in hospitals on the continent, and among others, in one on Frankfort on the Maine. Chaussier recommends on the other hand a very simple apparatus by which moist vapour is conveyed directly from the boiler on the fire through a tube on the body of the person asphyxied, or otherwise invalid, and retained under the bed clothes.

The vapour bath employed at particular stages of febrile diseases, when the skin has lost the morbid heat and activity of capillary action which mark them at an early period, would prove a useful auxiliary to, and might indeed advantageously take the place of other remedies.

In some protracted and unusually obstinate cases of intermittent fever, this kind of bath has been productive of entire and permanent relief, and we may infer that in a proper selection of cases of remittent fever, its effects would be equally conspicuous.

We have the favourable testimony of Chaussier to the remedial power of vapour bathing in puerperal peritonitis and other maladies which occur during and after delivery, such as pain of the bowels, serous diarrhœa, oppressed breathing, &c. He observed on these occasions that the pulse, which was commonly small, contracted, and very frequent, often lost while the patient was exposed to the vapour bath, these characters of irritation, and became full, soft and *sudoral*. From the same authentic source, and none more so could be referred to, we also learn the use of

vapour towards the conclusion of eruptive fevers, such as measles and scarlatina, where the skin is dry and rough.

In the preceding account of the use and success of the vapour bath, we have had constant reference to that mode of its application by which its primary action is on the skin alone, the head of the invalid being out of the bath, so as to allow of his breathing the common atmospherical air. In a long list of diseases, the immersion in the vapour might be complete, so that it should be inhaled into the lungs, and thus applied to their inner surfaces. The mode of administration would even have marked advantages where the pulmonary mucous lining is in a state of irritation, and the skin at the same time dry and the perspiration deficient, as we find in catarrh, bronchitis, croup, asthma, and a certain stage of measles and small pox. Where, on the other hand, the lungs are perfectly sound and clear of irritation, while there is a febrile disturbance in the system, with thirst, and small or active, or a hard pulse, it would be of great advantage to introduce moisture freely into the pulmonary cavities, as it would be rapidly and greedily absorbed and carried into the circulation, and act as an effectual diluent. The grand point on all these occasions from which our attention is never to be diverted is, that the degree of heat of the vapour shall bear due proportion to the heat and febrile excitement of the system, so that there shall be an inverse ratio between the two; the greater the excitement the lower the temperature of the vapour bath, and the reverse.

The reader has been already apprised that in inflammation of the throat and air passages and other phlegmasia, Assalini used vapour of the low tempera-

ture of 90° Fahrenheit. Where the excitement was less and the malady of a chronic nature, he raised the heat to 100° Fahrenheit (30° R.). In general we may agree with Marcard that vapour baths under 96° Fahrenheit have not much activity. We are not, however, to take our sensations in a hot water bath as a measure of the manner in which a vapour one of the same temperature would affect us. The heat is much more promptly imparted to the body by the denser medium of water than of vapour, and hence the former at 95° would feel as warm as the latter at 100°.

In the vapour baths of Basil Cochrane at Portman Square, London, on a large scale, and adjoining his own residence, the temperature at which they have been used with advantage by many persons suffering under chronic rheumatism, catarrh, gout, gravel and ophthalmia, was as high as 120°. We have not learned whether the application of the vapour in these cases was local and partial, or general.

Dr D. T. Coxe of this city has published a short paper on the efficacy of the vapour bath,* which he superintended at the time, in various diseases. In most of them the vapour was inhaled as well as applied to the surface of the body. The diseases enumerated, greatly relieved, or entirely cured, were chronic disease of the liver, rheumatism, ulceration of the fauces, pimples and other blemishes on the skin, enlarged spleen, with tendency to dropsy, dyspepsia, inflammation of the kidneys, hemicrania, influenza and erysipelas. In reference to the dyspeptic patients who used the bath, he informs us that it removed the costiveness of the bowels, and generally improved

* North American Medical and Surgical Journal, Vol. IV. p. 20—27.

their complexion; perspiration was with difficulty brought on. We are told that "here the benefit terminated. Indeed in one case the inhalation of so much warm vapour seemed to excite too much phlogosis in the stomach, as the patient was worse after taking several baths, and attributed to them this effect." The erysipelas, says Dr C., was one of the diseases which yielded readily and kindly to the influence of the vapour bath.

It was remarked that the peculiar odour of some of the articles, through which the steam was made to pass before its being applied to the body of the patient, was perceived in the urine.

The temperature of the bath is not regularly mentioned by Dr Coxe. In one case, a person suffering under cutaneous eruption, accompanied with a torpor of the liver, it was at first about 104° , in which the sweating was profuse. Each time the temperature was augmented until it reached to between 115° and 120° . This case serves to illustrate a fact mentioned by all writers on this subject, viz. the impunity with which a person who has been exposed to the elevated temperature of a vapour bath can subsequently bear cold. The person in question "was in the habit of taking several tumblers full of cold water while in the bath; and neither in this case nor in any other in which this usage was followed, did any bad consequences result."

Under the next head of our subject, or the dry vapour bath, are included the simple variety of heated air, the *sudatorium* or *laconicum* of the Romans, and the warm bath as it is often but erroneously called of the Turks and Persians and other people of the east. I need not here repeat or dilate on the particulars connected with the processes of bathing pursued by these

different people: they have been already placed before the reader in the first chapter of this work.

The other, and more strictly medicinal variety of dry vapour baths is sulphurous. The works of Galès of Paris, Assalini of Naples, and De Carro of Vienna, are so clear and conclusive in respect to the marked utility of this remedy in a great variety of diseases as to dispense me from attempting more than a brief summary of the practice. While advancing this opinion, it is mortifying for me to be obliged to add that at this very time there is not either a simple or medicated vapour bath in this city with its large population, and numerous institutions devoted to the relief of suffering in nearly all its forms. There have been apparatus for both moist vapour baths and sulphurous fumigations under the superintendance of highly respectable physicians; but so indifferently were they encouraged, that is, so few resorted to them, that both have been abandoned. Such aids to successful medication and consequently to discriminating charity ought at least to be found attached to our Hospital and Almshouse Infirmary. It is not sufficient for the members of the medical profession to be able to say that they are not ignorant of a remedy; they should be able to say that they can use it, and speak from intimate conviction of its real value. This remark is more peculiarly applicable to those physicians who have charge of hospitals and infirmaries, and whose opportunities for procuring whatever is new and useful, and of testing still farther their efficacy, are so superior to those engaged in private practice. Be it said, however, in our justification, that managers and directors of charities are not in the practice of regularly consulting physicians, touching even those subjects about which

the latter may be presumed to be more particularly conversant. The Chinese reason for continuing things as they are is not without many imitators at home. "What is the use of that odd practice I observe among you," is often the remark of a European or American at Canton. "O," replies the philosophic Chinaman, "that have been done long time ago; that have old custom." We hope that the directors of many of our institutions, as well for charitable as for scientific purposes, will be less Chinese than heretofore in their opposition to reform, the idea of which does not happen to originate from themselves.

Natural sulphurous vapours are largely given out at different places in the vicinity of Naples; principally at the grottoes of *San Germano* and at *Monte Secco* and *Solfaterra*. At San Germano there are several rooms excavated in the side of the hill, the air in which raises the thermometer to 122° Fahrenheit, or if applied to the fissures from which it escapes, the mercury mounts up to the degree of boiling water. The traveller, who has visited Naples and its environs, is aware that on the opposite side of the road to these *stufe* is the celebrated *Grotto del Cane*, resembling a small hut at the side of the hill. The hollow at the basis of the hill, formerly the crater of an extinct volcano, is now a lake, *D'Agnano*, from the stagnant waters of which, especially during the season of steeping hemp, exhalations of a deleterious kind are said to arise. This may be one reason why the *stufe* of San Germano are now so entirely neglected.

The success, which attended the practice of Assalini with the simple and medicated moist vapour bath, was not less signal with his dry vapour bath by sulphurous fumigations. By improving and simplifying the

invention of Galés, D'Arcet, and De Carro, he succeeded in making apparatus in which the vapour of sulphur could be conveniently applied either to the skin of the whole body, excepting the head, or to any part of it without its escaping and offending the lungs.

The sulphurous fumigations were administered by Assalini in nearly all the varieties of disease in which the moist vapour had been applied; but with somewhat more reserve, however, in sthenic habits, or where there was much general or cutaneous irritation. In the itch his success was as signal as that of Galés himself. He directed the treatment of six hundred and eighty-three soldiers for this disease in one year, on whom five thousand fumigations were practised: and they were all cured without their experiencing any subsequent uneasiness. Of these, twenty-three had other diseases, such as rheumatism, syphilis, paralysis partial, chronic ulcers.

The Italian physician is in accordance with Sir A. Clarke, in asserting that the effects of mercury given for the cure of syphilis are more prompt, diffusive, and benign, and that salivation is less apt to occur, and less violent, if sulphurous fumigations and the common vapour bathing are used with it conjointly. Experience now satisfies us that for the cure of syphilis in its various stages, we may rely on these adjuvants to the entire exclusion of mercury. In the secondary forms of the disease, when the throat is the seat of ulcerations, or the skin of blotches, or still farther, the fibrous system of nodes, syphilitic rheumatism, &c. the treatment by alternate sulphurous fumigations and moist vapour will be attended with complete success.

Ulcers, whether scrofulous, or mercurial, or asso-

ciated with depraved digestion, will yield to the same course, provided a plain light diet be used and dilution by simple drinks.

Among the numerous cases detailed by Assalini in which he used the vapour bath and fumigations with decided success, were those of *tumefaction of the inguinal glands*, with and without syphilitic taint, *inflammation of the parotid gland*, *acute rheumatic attacks in a joint or limb*, *chronic rheumatism*, *chlorosis*, *ulcers after congelation of a part*, *herpes* in various forms—sometimes with *suppressed hæmorrhoids*, or with *syphilis*, or *hepatic disorder*; *cough*, sometimes *convulsive*, at others with symptoms of *incipient consumption*, *hemiplegia*, and other forms of *palsy*, *gout*, *hepatic obstructions*, *sciatica*, complicated with *anasarca* in one case, and in another with *hæmoptysis*. In a case of *hypochondriasis* with *neuralgia*, Assalini obtained the happiest results by the use of sulphurous fumigations, and substituting a light vegetable diet, with fruits and milk, in place of aromatic and tonic tinctures, and a stimulating regimen.

The temperature of the sulphur bath was generally about 100° Fahrenheit. In one instance in which it was gradually raised from 95° to 104°, the patient, affected with *furfuraceous herpes*, sweated profusely. His pulse, after the fumigations, was soft, full and compressible, and less frequent than before. He was cured in three months, during which he took sixty-two fumigations with sulphur and some vapour baths, with mallows infused in the water. The period of duration of the vapour bath, as also for the fumigations, was usually half an hour. It is worthy of remark, as confirmatory of the views which I have advanced re-

specting the *modus operandi* of vapour baths in general, that under the use of the sulphurous fumigations, in cases of hepatic obstructions, there often took place, says Assalini, copious bilious discharges.

Assalini, towards the conclusion of his work, giving the details of his success with the Neapolitan soldiers already noticed, assures us,

1. *That those persons who make use of artificial vapour baths may, very shortly after being well dried, and resuming their usual habiliments, expose themselves to the open air without any risk of getting cold.*

2. *That the vapours and gas, evolved from sulphur by means of caloric, are absolutely harmless both to persons in the bath, and to those who are in attendance as assistants.*

3. *That there is no exhalation of sulphur from the bodies of those who have made use of the sulphurous fumigations.*

It will not be deemed an inopportune occasion for me to introduce the conclusions, in the report of the committee or jury in Paris in 1814, on the efficacy and advantages of the treatment by sulphurous fumigations.

“1. That sulphurous fumigations cure perfectly every kind of scabies, even the most inveterate.

“2. That the number of fumigations requisite to cure scabies varies from four to twenty; according to the age and sex of the patient, and to the intensity, the species, and the complication of the disease.

“3. That females and infants, *cæteris paribus*, require a smaller number of fumigations than adult males, and particularly than old men.

“4. That old inveterate cases of scabies are cured proportionably more quick than recent cases.

“5. That the length of time required for each fumigation is ordinarily about half an hour.

“6. That patients may take even four fumigations daily; according to their temperament, their leisure, or their anxiety to obtain a more or less rapid cure.

“7. That the treatment of scabies, by sulphurous fumigation, does not require any auxiliary treatment, either internal or external; nor any sort of particular regimen.

“8. That, compared with all other known modes of treatment, even with those that are regarded the most rational and the most efficacious, such as sulphur ointments, mercurial ointments, mercurial lotions, arsenical frictions, lotions of tobacco, baths of sulphuret of potash, &c. &c. the treatment by sulphurous vapour appears to excel very much in simplicity, brevity, innocence, and efficacy.

“9. That it is also much less expensive than any of the others.

“10. That various other cutaneous diseases, such as pedicular affections, prurigo, tinea, dartres, even inveterate and regarded as incurable, are susceptible of yielding to sulphurous fumigations.

“11. That, in general, other chronic eruptive diseases require a greater number of fumigations than scabies; but that this means should always be regarded at least as an auxiliary, in the treatment of these diseases.

“12. That it is of the greatest importance to make known the advantage of these fumigations, to propa-

gate them, to establish them in hospitals, on board vessels, in camps, in barracks, in prisons.

“(Signed) PINEL, A. DUBOIS, A. E. TARTRA,
ESPARON, and BOUILLON-LA-GRANGE.

“ Seen and approved,
“(Signed) MOURGUE.”

As far as the practice of simple and medicated, and moist and dry vapour bathing has been carried in this city, the result has proved satisfactory. I have already spoken of the experience of Dr D. T. Coxe in watery vapour, simple and medicated. It remains for me now to refer the reader to a paper on the subject of sulphurous fumigations by Doctor Emerson,* in which, after detailing several cases from Galès, he gives some which came under his own observation. The result is well calculated to fix our confidence in this treatment, and render it a fixed part of medical practice independent of fashion and whim.

In thus admitting the value of sulphur fumigations as a remedy in a great number and variety of diseases, we are not, however, to regard it as of unerring certainty in even that malady for which it was at first mainly employed, and by the cure of which its reputation became established. I refer, of course, to the *scabies* or the itch. On this point I cannot do better than to introduce the following remarks from a late work of high authority on the subject of cutaneous diseases. †
“ In children, lotions of soap and water and artificial sulphurous baths are all that are requisite. Baths and

* Philadelphia Medical and Physical Journal. Vol. III.

† A Practical Synopsis of Cutaneous Diseases, &c. exhibiting the Practice of Dr Biet of the St Louis Hospital; translated with notes. Philadelphia, Carey, Lea and Carey, 1829.

fumigations are excellent auxiliaries in the treatment of scabies, but cannot be depended on alone, as the treatment is much prolonged. Sulphurous baths effect a cure more promptly, and never occasion other symptoms; the usual time of treatment is twenty-five days. Sulphurous fumigations are far from producing the marvellous cures that have been attributed to them; they are often useful as auxiliaries particularly in old persons, but when used alone, the average duration of the treatment is thirty-three days, one fumigation being used each day; but this method is fatiguing, and will seldom be submitted to by patients. What are we to think of those who advise two fumigations per day in order to hasten the cure?" p. 118.

The artificial sulphurous baths, recommended by the writer, are prepared by adding to common water hydrosulphuret of potass, sulphuret of potass (liver of sulphur), and sulphuret of lime, in definite proportions.

The practice of mercurial fumigations, once strongly advocated by some experienced physicians and surgeons, as quicker and more efficacious in the cure of syphilis than of the internal administration of the medicine, now engages less attention, from the circumstance of the change of opinion, both as regards the nature and treatment of this disease. The preparations of mercury used for fumigations having been generally the sulphurets, we are justified in believing that a share of the relief following their use was due to the sulphur, since we now know that the fumes of this last substance alone will exert all the beneficial effects once exclusively attributed to the mercury. The cases in which the fumes of the sulphuret of this metal are thought most serviceable are ulcerations of the fauces, extending rapidly, and threatening the larynx and nares.

Another variety of the dry vapour bath is that obtained by heating alcohol or spirits of wine and applying it, thus vaporised, to the skin of the patient. Some years ago large claims for countenance and praise were made on the American public in favour of Mr Jennings, who, it was alleged, had made valuable discoveries both in the mode of applying alcoholic vapour, and in the particular cases in which it proved beneficial. Without denying to Mr Jennings all merit of originality, I may be permitted to inform the reader that in the work of Dr Gibney on Vapour Bath, we have an engraving of a "Domestic Sudatorium," as used by Dr Charles Gower of London, which differs little in appearance and nothing in principle from the spirit lamp vapour bath of Mr Jennings.

Our knowledge of the effects of fluid alcohol on the animal economy when taken internally is not such, as *à priori*, to encourage to its free use externally. As a mere means of applying heat, simple heated air is generally preferable. That in some cases of extreme torpor of the skin and system at large, the alcoholic vapour has been of service we are well assured; but it is not easy to specify any disease or class of diseases in which some of the other varieties of vapour may not be advantageously substituted for it, with more safety and prospect of success. It produces at first great dryness of the skin, followed after a while by copious perspiration. When this last does not soon come on, we might with advantage sponge the skin with cool or tepid water.

Camphor vaporised and applied to the skin has been found useful in chronic rheumatism.

There is another modification of the use of vapour for medical purposes which consists in the inhalation

of this substance, and its direct application to the lungs. Recently this practice has acquired some vogue; but we are constrained to admit that although it merits still farther cautious and systematic trials, the results so far have not by any means been of that conclusive character which entitle it to our confidence. In this remark I mean to refer more particularly to medicated vapours by the addition of active chemical agents, rather than to simple aqueous vapour. Of this last I have already spoken in terms of eulogy, nor can it be doubted but that it is an agent which might be and ought to be still more extensively used than hitherto, in some one stage of nearly all the diseases of the pulmonary apparatus.

The vapour of tar was at one time recommended as peculiarly adapted, by its alleged balsamic powers, to heal ulcers of the lungs. Dr Mudge, on the subject of his inhaler, recommended the fumigations of balsams, and laid especial stress on the virtues of tar; so much as to assert in a strain abundantly extravagant, that much of the benefit which consumptive patients experience from sea voyages is derived from the tar vapour constantly present on board a ship. Its place among the remedies for this disease has been mainly preserved for it by the essay of Sir Alexander Crichton.* Dr Paris (*Pharmacologia*) is inclined to think well of it from the result of a trial of its effects. No details are given to strengthen the faith of the reader. He goes on to say, "The tar employed should be that used in the cordage of ships, to every pound of which half an ounce of sub-carbonate of potass must be added, in order to neutralize the pyroligneous acid generally found mixed with tar; the presence of

* An Account of some Experiments made with the Vapour of boiling Tar, in the Cure of Pulmonary Consumption.

which will necessarily excite coughing; the tar thus prepared is to be placed in a suitable vessel over a lamp, and to be kept *slowly* boiling in the chamber during the night as well as the day; the vessel, however, ought to be cleaned and replenished every twenty-four hours, otherwise the residuum may be burnt and decomposed, a circumstance which will occasion increased cough and oppression on the chest."

Iodine, of late years so extensively employed in scrofulous affections and increased mucous discharges, has been very recently recommended to be converted into vapour by a mild heat, and in this state inhaled for the cure of chronic bronchitis and pulmonary consumption. The chief writers in favour of this practice are Drs Murray, Scudamore, and Berton. The first of these seems entitled to the merit of priority of suggestion, as well as of having tested his idea by actual experiment.

"The valuable property," says Dr Murray, "possessed by iodine, of subliming where *moisture is present*, below the temperature of boiling water, and of remaining diffused at low degrees of heat (even that of the atmosphere), when humid, entitles it to attentive consideration as a remedy by inhalation."

The apparatus described by Dr Murray for the supply of simple or medicated vapour to be inhaled by the patient is very simple.

It consists first, of a turned iron vessel holding four gallons of water. It may be made larger or smaller according to the dimensions of the apartment and

* A Dissertation on the Influence of Heat and Humidity, with Practical Observations on the Inhalation of Iodine and various Vapours in Consumption, Catarrh, Croup, Asthma, and other Diseases. By John Murray, M.D. London, 1829.

season of the year. This vessel requires to be replenished with water three times in twenty-four hours. Where it is desirable to preserve uniform temperature, boiling water can be used in refilling the vessel.

2. A large stopper for introducing the water: it is furnished with a hook on which a small bag of iodine, hops, or any eligible substance can be suspended in the steam.

3. A wet cloth to be thrown round the pipe, to condense the vapour if it comes over too rapidly.

4. The orifice where the steam escapes: it is best made with a screw, in order to adapt an additional pipe where the bed is distant. The opening is about a quarter of an inch in diameter.

5. A small slide, with hooks, on which a cup of iodine, or any other medicine may be suspended by the jet of hot vapour, if this method be preferred to suspending the substance within the vessel. "Here it may be remarked," says Dr Murray, "that with a moderate fire, and heat of the room at 68° , a thermometer placed three inches from the orifice in the steam arose to 178° ; in seven minutes, at six inches distance, to 148° ; at nine inches, during seven minutes, to 120° ; at one foot, during seven minutes, to 100° ; at fourteen inches from the mouth of the pipe, the vapour can be easily inhaled, if requisite.

As intimately connected with the practice of inhaling vapours and showing the philosophy on which it rests; and the means by which, generally, it ought to be carried into effect, the following remarks of Dr Murray will find properly a place here.

"We observe how copiously the minute odorous particles of flowers are communicated, and rendered sensible to our olfactory organs, when the air is loaded with moisture, which, in a dry atmosphere, or

when the membranes are thickened, or parched by a cold, could scarcely be perceived.

“ ‘ In climes full of sunshine, though splendid their dyes,
Yet faint is the odour the flowers shed about:
'Tis the clouds and the mist of our own weeping skies,
That call their full spirit of fragrancy out.’

“ Besides, it appears to me that there is a condition of the mucous membranes of the air passages and vessels, in certain stages of pulmonary complaints, in which the tissues are preternaturally dry,—either from their texture being altered by cold or excitement, their pores closed, the natural lubricating mucus and fluids dried, or not secreting, and a certain morbid thickening of the coats of the air tubes taking place, calculated to diminish the caliber of their cavities, as well as to render their tunics less permeable to the air, during respiration. This state of the parts will be much benefited by inhalation of aqueous vapour judiciously applied. The old or common mode of drawing in *vapour by the mouth, and cold air condensing it by the nostrils*, was calculated, in many cases, to produce more injury than benefit. After premising the most approved modes of removing or preventing the accession or progress of inflammatory action, the vapour of water should be made the vehicle of communicating such desirable medicinal qualities or principles, as are soluble or diffusible in it. Nor is it the worse than useless method of breathing, for a few minutes, from a teapot, or a tin inhaler, that can benefit. On the contrary, the advantage is derived from the long continued contact of the humid vapour, and the *regulated temperature*, keeping the otherwise dry and parched coats of the pipes bedewed for a *sufficient time*, to enable

the alteration in their condition, and the softening in their textures, to begin, and proceed, so far as to induce a new and more healthy state of their proximate principles, and a more natural condition of their actions, secretions, and circulations.

“But if the simple contact, and more permanent application of aqueous vapour alone, aided by the influence of altered temperature, and disposition of parts, can be so productive of good local effects, when properly applied, both as to time and method, is it not right to infer, that water may be the medium of conveying medicated vapour to internal surfaces, likely to profit from their application? The vapour of water, contained in the atmosphere, will communicate to a man in health as much of the soporific qualities of certain vegetables, if strewed around, as will compose and dispose to sleep. I hope yet to see the day, when some salutary mode of preventing many untoward degrees of pulmonary affections, may be directly exhibited to the parts in danger, through the medium of vapour; many of the primary degrees of disease, in those parts, removed; several of the more advanced or incurable stages relieved; the ravages of hepatization and ulceration retarded; and, where that termination is unavoidable, the approaches to dissolution smoothed and composed.”

“But inhalation of vapour has several advantages more than those of prevention, as above stated. Even in advanced pectoral affections, such as ulcerated lungs, or diseased mucous surfaces, the volume of aqueous vapour taken in lessens the proportion of atmospheric air presented to these parts. When they are denuded, parched, or inflamed, air affects them as a very active stimulus. Its perpetual renewal, at

each inspiration, produces, by its frequent contact, injuries, which its more diluted or attenuated introduction would be less likely to accomplish. Therefore, if you inhale vapour which condenses in the cells, at least a small part of it, it bedews and covers the surfaces and ulcerations, by which means you exclude the application and arid excitement of the dry air. You do more: if you inhale ten inches of artificial vapour of water, mixed with ten of atmospheric air, you go far towards warding off the irritation of the latter from the moistened membranes *and superficies of the sores.*

“It is incredible the quantity of watery vapour that may be taken into the lungs; a patient will inhale it during four hours, through a close bag, appearing to admit little atmospheric air.”

In using, says Dr Murray, the apparatus already described, or when a cup, tube, or vial containing moistened iodine is placed in the stream of vapour, the iodine sublimes in beautiful violet exhalations, from which the substance itself derives its name. “I mention this,” says Dr Murray, “because I knew a young lady, a patient, very much alarmed when she saw the vapour approaching her breath, purpled almost like the ominous colour of blood.

“In places where the vapour is not observable, holding a spoon wet in starch and water, near it, soon turns the starch blue, and is a proof of its rising in the room.

“In this trial the heat must not be high, and the iodine requires to be simple, or uncombined. I have noticed that the vapour of iodine, mixed with that of water, tinges a silver spoon gold colour, then dark. In summer, or where it is not advisable to keep the

apartment warm with the boiler, a small cup of moistened iodine, set in a bowl of hot water, elevates abundance of the medicine through the air about the bed. It is less liable to decomposition in this way, than when mixed in water in a tin or iron boiler, where a sediment, like damp or wet rust of iron, soon subsides.

“It is so easy to keep the air of a room, in which vapour of water is diffused, so impregnated with iodine fumigation, that there is less necessity for resorting to any of its compound vapours. The gas, however, which is a component of hydrogen and iodine vapour, called *hydriotic*, could be easily diffused, in dense white clouds, from water charged with it. This, also, would saturate the atmosphere of an apartment, without the aid of artificial heat, Where there is the hectic flush and undue evolution of animal caloric, and when the palms of the hands feel much hotter than they really are, a wide mouthed vial of moistened iodine, grasped in the hand, abstracts its fervid temperature, and at the same time supplies the breath with abundant odour of the shore. A thousand other means of diffusing the fumes of iodine present themselves: a vial, a cup, or a glass tube, containing wet iodine, if suspended in the jet of steam, as it leaves the orifice of the pipe, will spread the vapour far and wide. In this manner a stream of it can be directed by a thin glass pipe, over the patient’s face in bed, its great specific gravity causing it to fall and be inhaled. An atmosphere of iodine vapour, and that of water mixed with air, can be regulated to such strength as the patient finds agreeable. Such an apartment instantly reminds you, on entering, of the smell arising from kelp kilns, when burning marine vegetables along the coasts.”

Plausible as are the views and suggestions of Dr Murray, they are corroborated by one case only of iodine inhalation; the success in which, without being complete, was still encouraging.

Doctor, or, as we must now call him, Sir Charles Scudamore, has lately published a small treatise* in which he gives the history of some cases intended to show the sanative properties of iodine vapour when inhaled. He denies in his preface being a copyist of the views and practice of others in this particular point, and tells us that when he commenced his investigation of the powers of iodine, used in the way of inhalation, he had never heard a suggestion on the subject. All this may be so. It only shows that Sir Charles did not read on the subject which was engrossing so much of his thoughts. His preface is dated November 12th, 1830. Dr Murray's work was published in London in 1829, and the case detailed in it was attended by him and Dr Fourcade in the latter months of the same year. Sir Charles refers indeed to this work in the body of his treatise. But there is another more serious complaint to be made against Sir Charles. He dwells with considerable complacency on his success with the new remedy, gives a detailed account of several cases in which it formed part of the treatment; but he takes especial care not to favour us with a description of the mode of using it, nor of the apparatus by which it is administered. If this is not Charlatanry, it comes so near the thing as hardly to require another name to designate it. As, however, his compatriot me-

* Cases Illustrative of the Efficacy of Various Medicines administered by Inhalation in Pulmonary Consumption; in certain Morbid States of the Trachea and Bronchial Tubes, attended with Distressing Cough, and in Asthma. London, 1830.

dical critics and reviewers have so freely commented on the impropriety of this conduct, I shall refrain from any further censure on it in these pages, than merely to hope that quackery, consisting, as it does, in concealment and implied fraud, will never be tolerated by a profession called liberal.

The nearest approach to gratifying our curiosity, as to the mode of employing inhalation used by Scudamore, is in the following sentence; in which, after speaking of his failure in other means, and his resolving to have recourse to iodine, he says, "I employed a preparation of it miscible with hot water, so as to remain in permanent solution, using for the purpose of inhalation a glass apparatus, well fitted in its construction for the exhibition of the remedy in the form of vapour."

The cases detailed by the author are not so conclusive of the paramount virtues of iodine, as illustrative of its being a very useful auxiliary remedy; since other substances were added to it, and being converted into vapour, were inhaled at the same time. The first two cases of pulmonary consumption of which he gives an account, were, he foresaw, evidently incurable. Still he had reason to be satisfied with the power displayed by the iodine of mitigating some of the most violent symptoms, and giving the patients comfort. After describing the condition of the first patient, he goes on to say:

"I prescribed a weak solution of iodine, with the addition of some saturated tincture of conium, mixed with water of 120 degrees of heat, to be inhaled for fifteen or twenty minutes, three times a day. I directed him to take a minim of a solution of acetate of morphia, containing a grain of the acetate in six

minims, in a simple saline draught at bed-time, and to repeat this dose in an hour or two if necessary; to regulate the bowels by simple means; to wash the chest and upper part of the back with a mixture consisting of two parts of water, one of eau de Cologne, and one of vinegar; dipping a towel in the lotion for that purpose.

“I shall confine myself to a general statement of the further particulars of this case, as its termination was so necessarily fatal.

“On first using the inhalation, he experienced slight giddiness for a few minutes, and some sense of soreness with dryness in the tongue and throat; but the patient rather mentioned these sensations on being interrogated than complained of them; and they did not continue. He soon found that it afforded him great relief, the power of expectorating being remarkably facilitated; the cough also very much abating; the respiration becoming comfortable; and the chest materially freed from oppression. In all respects, he improved in a surprising manner. At the end of a fortnight, the pulse ranged below 100; the looks and the strength were improved; and both he and his friends, flattered by this rapid amendment, anticipated an eventual recovery of health.”

The patient went out of doors twice, caught fresh cold, and in two months from the date of his physician's first visit ceased to live. “He always expressed in strong and grateful terms how much comfort and benefit he derived from the inhalation.”

In the second case, pulmonary consumption in its last stage, the treatment was as follows:

“I prescribed an inhalation of iodine with conium, the sixth of a grain of acetate of morphia at night, and

medicine in the day calculated to allay the intestinal irritation. I directed the chest to be washed with the compound vinegar lotion (page 329). The diet was made as nutritious as the weak digestive powers would allow.

“Extremely debilitated as this patient was, he could use the inhaler without difficulty; thus affording a proof of the convenience of this simple apparatus. The relief which was obtained from this process in the course of a few days was most remarkable, and such as to exceed my utmost expectations. The patient’s description of the effects of inhaling was, that it abated the cough remarkably, and rendered the expectoration, which before had been much suppressed, easy and free; from which change ensued a comfortable state of chest, with a great improvement in the breathing. He observed, that he felt the inhalation very sensibly traverse the chest; causing an agreeable sense of warmth. By means of the acetate of morphia, the nights were passed in comfort. On former occasions, when opiates had been given, they disagreed so exceedingly, that he declared ‘the remedy was worse than the disease.’”

This patient continued in a course of alternate amendment and relapse for many weeks, and finally sank under his disease.

The account of this case begins thus: Hæmoptysis, succeeded by ulceration, hectic fever, well marked; from all concurrent symptoms, the existence of phthisis pulmonalis established; the curative powers of iodine inhalation strongly displayed.

The subject here was a female aged thirty-four years of age. I have not room for the notice of the symptoms. Percussion and auscultation were had recourse to in all the cases.

The doctor describes the treatment thus:

“ I prescribed a weak solution of iodine for the inhalation; internally, from one to two minims of the solution of acetate of morphia; and the following draught before rising in the morning:

R. Magnes. sulphat. ℥i.
 Infus. rosæ ℥xii.
 Acidi hydrocyan. ℥i.
 Syrupi tolutan. ℥i.—M. fiat haustus.

The chest all round was washed night and morning with the compound vinegar lotion.

“ The diet was limited to boiled fish, vegetables, and farinaceous puddings. At the end of a few days she found herself improved, and particularly as to the greater facility of expectorating, more ease of chest, and better respiration. The cough, however, still being very irritable, I added conium to the inhalation.”

At the end of a fortnight the symptoms were greatly mitigated and the amendment very obvious. Fresh cold was taken, however, and the cough became more irritable. The inhaling mixture was changed for one consisting of conium and prussic acid. This indisposition soon yielded to treatment, and the iodine inhalation with conium (hemlock) was resumed, and with an increased proportion of iodine. Among other evidences of returning health on this course were gain of flesh and strength.

She had been most attentive to the use of the inhalation three times a day, and extolled it as the source of her improvement. The morphia was discontinued at night.

The diet is worthy of notice. “ She took mild animal food each other day, and at dinner two ounces of old port in a tumbler of cold water. She continued

the use of the vinegar lotion. She took carriage exercise when the weather was favourable, and walked out occasionally."

In another fortnight her physician "prescribed a saline draught, omitting the hydrocyanic acid, and allowed her to take meat or poultry every day. She continued to amend regularly. The catamenia returned. Three months having elapsed, she had recovered so completely that no farther treatment appeared to be necessary. For the last week she had inhaled twice a day."

The cure in this case was complete.

The fourth case in Sir Charles Scudamore's practice is described as, "Bronchitis attended with high irritation. The existence of tubercles questionable. The utility of inhalation well shown, as materially assisting in the removal of the symptoms."

It is not to be expected that I should repeat the account of this or of the cases which follow, in the same detail as the others. My object was to make the reader acquainted with the practice of Dr Scudamore, and to apprise him of the share which the inhalation of iodine may be presumed to have had in the cure. In this case of bronchitis, the treatment consisted of leeches to the right side of the chest, and the lower part of the sternum, and a blister between the shoulders; acetate of morphia at night; a mixture in the day with sulphate of magnesia, infusion of roses, and one minim dose of hydrocyanic acid; and an inhaling mixture composed of conium, hydrocyanic acid, and an alcoholic tincture of ipecacuanha.

At the end of a few days, the urgent symptoms being relieved, the use of the iodine inhalation with conium was directed, the other medicines being con-

tinued in minor doses. The inhalation was used for twenty minutes, three times a day, and at the end of a week the proportion of the iodine was increased, and the conium was omitted. This change was made on account of the diminution of all the symptoms.

Case fifth was of chronic cough depending on tuberculous irritation, cured by the inhalation of iodine and hemlock.

Sir Charles seems aware of the doubts which may be raised respecting the cause of his success depending so much on inhalation, and replies to the objection in these words: "In answer, I must observe that an immediate and decided relief to the cough was given by the inhalation, such as could not be ascribed to any other cause; that various medicines which had been tried had proved ineffectual; and that in similar cases I have wholly failed to produce the same benefit by internal medicines alone."

The history of case sixth is thus headed: "Phthisis pulmonalis; tubercles in each lung; great probability of an ulcer at the apex of the right lung; hectic fever present; the iodine inhalation highly beneficial; the tubercular irritation removed; and the patient restored to health."

The seventh case was of "Empyema with tubercles in the lungs." The patient was at one time convalescent; but exposure brought on a relapse which terminated in death.

In the eighth case there was ulcer of the larynx, with tubercles at the apex of the lungs. The good effects of iodine inhalation were well exemplified; although the termination of the case was fatal.

Case ninth was "Asthma—bronchitis—promptly

and very remarkably relieved by inhalation of iodine with conium."

Case tenth. "Chronic bronchitis. The cough extremely urgent; the secretion from the mucous membrane remarkably viscid. The iodine inhalation curative within a short period of time."

Case eleventh. "Habitual asthma. The difficulty of breathing attended with distressing cough readily induced by cold, damp, and especially by foggy states of the atmosphere. The symptoms satisfactorily relieved by inhalation."

Case twelfth. "Chronic laryngitis. The symptoms immediately relieved by an inhaling mixture of conium with hydrocyanic acid; and the affected parts further restored by the inhalation of iodine."

Case thirteenth. "Common irritable cough; speedily cured by inhalation of conium."

Case fourteenth. "Chronic bronchitis. The cough extremely urgent, and the bronchial secretion unusually viscid and tenacious. The cure effected by inhalation and counter-irritation."

Case fifteenth. "Bronchitis unaccompanied with fever. The cough very urgent, and remarkably relieved in a short time by an inhaling mixture of conium, hydrocyanic acid, and ipecacuanha."

Case sixteenth. "Spasmodic asthma. Very satisfactory relief obtained from the inhalation of æther, conium, and ipecacuanha."

It will be seen from the above cases, that Sir Charles Scudamore has not pretended to restrict himself to the use of iodine inhalation alone; and it is difficult to say how far we can yet rely on this agent for the cure of the diseases mentioned by the author.

In his "General Observations and Conclusions," he endeavours to apologize for what he knew to be censurable in his concealment of the precise mode of conducting inhalations, by alleging his fear that patients might be tempted themselves to undertake the treatment of their own cases, if he introduced the formulæ of the remedies for inhaling. This is rather strange language from a professional man, who under circumstances like the present is presumed of course to be addressing himself to medical men, and not laying baits for catching patients by such half and half notices. Even if Scudamore wrote for popular use he ought to have given every the minutest detail of his practice, to prevent the mistakes and imperfect trials which he professed to dread; and which are much more likely to occur to patients than if he had frankly told them all he knew of the subject.

As a kind of atonement he offers the following farther particulars for the information of the professional reader.

"As by mixing the tincture of iodine with water, the iodine itself separates into flakes, which become precipitated, and as this medicine is very sparingly soluble in water alone, I found it expedient to form a preparation which should be uniform, and preserve its transparency when united with water. This advantage is effected by adding together iodine, hydriodate of potash, distilled water, and alcohol. The proportions of the ingredients are to be varied according to the circumstances of the case.

"The tincture of conium is a saturated tincture prepared from the dried leaves.

"The tincture of stramonium is a saturated tincture prepared from the dry leaves and stalks.

“The tincture of ipecacuanha is a spirituous tincture prepared from the roots.

“The hydrocyanic acid which I have always employed was of the specific gravity .994.

“The æther employed is the pure sulphuric æther.

“The chlorine solution is the saturated solution of pure chlorine gas in distilled water.

“Of all these agents, the iodine is the most active, and that in which I place my confidence as the curative remedy in phthisis pulmonalis. The temperature of the water with which the preparation is to be mixed should be from 115° to 120° of Fahrenheit; and, when the proportion of iodine is increased to a full measure for each inhalation, I direct that the quantity be divided into two equal portions, the one to be used for the first ten minutes, and the other for the same space of time in continuation; and, as the average frequency, three times a day: but sometimes it may be expedient to use it for ten or fifteen minutes only at a time, and three or four times a day. The inspiration should be as strong as can be conveniently made, in order that the vapour may freely enter into the lungs: but the patient should inhale in a manner not to fatigue the chest; and this evil will be avoided if he allow himself sufficient interval between the periods of inhaling to recover power.

“I lay it down as a principle, that inhalation should always be so conducted as not to produce distress to the patient in any way, either as regards the composition of the mixture, its strength, or the period of carrying on the process.

“In first entering on the treatment of inhaling, the irritation of coughing is usually produced; and in some cases this happens on every subsequent occasion;

but, unless this prove excessive or permanent, it does not form an objection to the treatment, for the power of expectorating is remarkably facilitated, and, the bronchial tubes being cleared, a material subsequent relief to the cough is afforded. But a curative and not merely a palliative effect is the object to be held in view.

“ The proportion of alcohol contained in the different materials is too small to produce any inconvenient stimulation; it is necessary as the menstruum, and it is useful also as causing the volatile parts of the medicine to rise more freely with the watery vapour.

“ The administration of the iodine inhalation is improper when any decided inflammatory action is present. It happens, occasionally, in phthisis pulmonalis, that blood is coughed up, either pure or mixed with the sputa. In the first case, it is most probably the consequence of a rupture of vessel, caused by the force of coughing, when there is an increased capillary circulation; and such appearance should induce us either to suspend the inhaling process altogether, or to use only sedative ingredients till the expectoration cease to be coloured. But, when the blood is of a very dark colour, instead of being of a bright scarlet, and, more especially, when it forms only a proportion of the sputa, we may conclude that it is the consequence of that slow ulceration by which small vessels are eroded; and in such circumstances I have not been deterred from using the iodine; but have always blended with it the conium. The disappearance of colour in the expectoration will confirm the propriety of the treatment.

“ The admixture of iodine, and also of chlorine,

with hydrocyanic acid is incompatible; as is also that of iodine with chlorine.

“ The tincture of conium is usually very soothing in its effects, and may be mixed with any other materials.

“ Tincture of opium may sometimes be used advantageously, either alone or as entering into the composition of the inhaling mixture. I have occasionally added it to the iodine solution; but, for the most part, I give the preference to the conium.

“ The tincture of digitalis produces sedative effects, and more especially when united with the hydrocyanic acid. In one case in which spasmodic irritation, united with slight symptoms of inflammatory action, prevailed to a great degree, I obtained the best effects from this mixture.

“ The tincture of stramonium exerts an antispasmodic power in asthma.

“ The tincture of ipecacuanha is expectorant.

“ The internal use of hydrocyanic acid is by some practitioners contemplated with great apprehension. I do not prescribe it except in very small doses, and which are perfectly safe; but I can confidently state that no inconvenience attends its employment as an ingredient for inhalation, while it often proves highly serviceable as a sedative and antispasmodic. The dose which I have usually employed has been from three to six minims, using the water from 100 to 110 degrees.

“ Æther is found to be very useful in a spasmodic condition of the air passages, and contributes to facilitate expectoration. It may be joined with any of the other ingredients, or used separately. Such is its

great volatility, that the water in the inhaling bottle should not be of a higher temperature than 100 degrees; and the quantity should be renewed every three or four minutes, ten minims being added each time; but the water need not be changed.

“In cold weather, especially, it will be necessary to keep the bottle containing the inhaling mixture (of any kind) immersed in hot water, during the process, in order that the proper temperature may be kept up.”

Dr Berton having first assured himself of the innoxious nature of the air loaded with iodine vapour, by experiments on animals, had recourse to it as a remedy for pulmonary consumption. Three patients labouring under this disease were, as he informs us, somewhat benefited. No cure is reported. Dr Berton feels more confidence in its efficacy when employed in chronic bronchitis. His mode of administering the remedy is thus described. In a flask with two tubular openings, he puts diluted sulphuric acid, and on this projects a quarter or half a grain per diem, of the hydriodate of potassa; the iodine is promptly disengaged in the form of vapour, and this is inhaled by the patient through one of the tubes of the flask. The process is repeated from four to ten times a day; the duration of each being from four to five minutes.

Here we have not only the inhalation of iodine vapour suggested, but actually employed as a remedy for pulmonary consumption, and the mode of using it described by Dr Berton nearly two years* before

* The above notice of Dr Berton's practice is taken from the North American Medical and Surgical Journal for July 1829. By an oversight, not common with the editors of that work, who are as anxious to lay before their readers the fullest and earliest European intelligence as to give each writer his due, the French Journal is not men-

Sir Charles Scudamore favoured us with his treatise, and the excuse for his withholding details, which every physician is bound to lay before his professional brethren—either when he publishes on the subject or when invited by them to make the communication.

In addition to the use of vapour by inhalation, it has been, as the reader may remember, advised by Assalini and others to be directly applied to the inflamed surfaces of the eyes, ears, nose, and mouth. For this purpose simple aqueous vapour has been found very serviceable, or that obtained from infusions of chamomile flowers, belladonna, digitalis, poppy heads, &c. In ophthalmia we are not sufficiently alive to the great relief obtained by such means—when all the collyria in the form of washes, aqueous or spirituous, with various salts in solution fail entirely. After the first or acute stage of inflammation of the mucous covering of the eye (*conjunctivitis*) has passed, but there still remains great pain, weeping, redness, and engorgement, the application of iodine vapour to the part, as recommended by Dr Murray, will be attended with happy effects. Nor can we doubt that in ulcerations following otitis, the fetor of the discharge would be removed, and the diseased surface be made to take on a healthy action by similar means, or by the union of iodine and conium vaporised.

Chlorine, taken by inhalation, is a remedy now engaging the attention of the profession. As is usual on these occasions, we have remote analogies and coincidences introduced as proof direct, in favour of a practice which was originated on other grounds.

tioned from which this information was derived; but we may reasonably presume it was one of the early part of the year.

Dr Murray, in the work often referred to, speaks thus on the subject of chlorine:

“If the statement of our respected friend, Mr Greenfield, be proved correct, that an atmosphere of chlorine gas and vapour of water prevents consumption, among his paper makers, a class of persons most of all obnoxious to that complaint, from their confinement, part of the day, in thick clouds of dust in a rag-loft of the paper-mills,—if chlorine and steam, dissipated through the works, can prevent phthisis, is it not reasonable to suppose, similar means might contribute towards the cure of persons who might have contracted the complaint? Would not, therefore, the junction of chlorine gas, and that of iodine, be a rational proposal, regulated, of course, according to the different degrees of the disease?”

By similar arguments we might be persuaded that the vapour from oak-bark decoction is useful in phthisis, since it is stated in some of the periodicals that tanners were not observed to be liable to the disease.

M. Gannal, a chemist of Paris, has tried the chlorine inhalation in many cases of pulmonary consumption; but as far as I am able to judge from the published accounts of his practice, and even from his own statements, biassed as they are by excessive partiality for the remedy, I should not feel disposed to regard it as safe and salutary in this formidable disease. Farther trials may be justifiable, but they ought not to be made without a full conviction of the powerfully irritating nature of the chlorine. As good a summary of the opinions and facts in this matter, as we are yet possessed of, will, I believe, be

found in the following notice from the North American Medical and Surgical Journal for January 1830.

“At a meeting of the Royal Academy of Medicine of Paris, (Section of Medicine) 11th of August 1829, M. Desportes reported on a case of phthisis cured by means of inhalations of gaseous chlorine, by Dr Cottereau, *aggrégé* of the faculty of medicine of Paris. The subject is a young medical student, of delicate health, and in whom all the symptoms of the tubercular affections of the lungs were observed in a very high degree. The patient was in a frightful state of debility and emaciation, and the disease appeared to be beyond all hopes of cure, when Dr Cottereau, by means of an instrument of his invention, administered the chlorine gas. The influence of this treatment was rapid, and the young man recovered perfectly. At the time the case was drawn up, *four months* had elapsed since the cure, and the subject of the case continued well, although he had applied himself to hard study, and had made botanical excursions of seven to eight leagues in one day.

“The reporter is of opinion that the chlorine exerted a beneficial influence on M. Cottereau’s patient, and affirms, that he has derived similar effects from this agent. He regrets, however, that the author has not entered into greater details relatively to the action of the chlorine. He adds that he has noticed the following symptoms after the administration of the remedy: irritations of the mucous membrane of the pharynx and bronchiæ, propagated to the lungs, copious expectoration, dry and fatiguing cough, redness of the cheeks, hot skin and frequent pulse. The vapours of chlorine can produce suffocation; but with

care it is easy to guard against all accidents. The reporter concludes by proposing, 1. That the Academy address thanks to Dr Cottereau. 2. That the latter be requested to continue his trials with remedy, and particularly to make experiments on animals in a state of health and disease, in order to ascertain the effects of chlorine. 3. That he be requested to communicate to the Academy the results, whether favourable or not, of his observations.

“M. Honore stated the case of a young woman, affected with phthisis pulmonalis, whom he treated, last winter, by means of chlorine gas. He obtained no success. M. Coutanceau announced that the chemist Gannal made a number of experiments of the kind at the Val-de-Grace, but without the least success. MM. Moreau and Merat cited instances in which chlorine administered in too great quantity occasioned injury to the patients. Finally, M. Rullier remarked that he had resorted to this remedy in his hospital; but hitherto without advantage. Notwithstanding this unanimous opposition to the beneficial effects of chlorine, the Academy decided that thanks should be addressed to Dr Cottereau.”

Sir Charles Scudamore remarks on the subject of chlorine inhalation:

“Of the chlorine solution I have to observe, that, as a remedy employed in the same manner and with the same views as iodine, it has not afforded me results approaching in value to those obtained from the latter medicine. In several cases of phthisis pulmonalis I substituted the chlorine for the iodine; but did not continue its use more than a few days, as its beneficial action was, in my opinion, very decidedly inferior; and, on every occasion, the patient, when re-

suming the inhalation of iodine, in strong language expressed his conviction of its being by far the most serviceable remedy.

“Chlorine, from its great volatility, comes over so quickly with the aqueous vapour, that the total quantity used at each inhalation should be partitioned into doses, if the process be continued beyond four or five minutes; otherwise its action will at first be too strong, and at last too weak. For the temperature of the water I prefer 110° ; and for each of the subdivided doses, from ten to twenty minims. I have usually found that the patient prefers the plan of protracted inhalation three times a day, to the greater frequency for a shorter time; although I consider this point for the most part optional.”

The fumes of muriatic acid have been of late recommended as a cure for pulmonary consumption. We have all seen in the newspapers an account, apparently well authenticated, of its efficacy in a case, whether of chronic bronchitis or tubercular disease is not known. The remarks made respecting chlorine are applicable to this gas.

The extravagant hopes entertained by Beddoes and others of the wonderful effects which were to be produced by breathing factitious airs—gases in specified quantities mixed with atmospheric air—have been long since dissipated; and the physician no longer hopes to find in the inhalation of pure oxygen gas or nitrous oxide a suitable stimulus to rouse the system from torpor, and to cure disease depending on obstructions, defective secretions, &c. nor in nitrogen or carbonic acid similarly used, a sedative to allay excessive arterial excitement and too abundant hematosis.

It remains for me, in concluding this chapter, to

mention some of the contrivances which have been resorted to for applying vapour to the lungs by inhalation, or to the skin as a bath.

Dr Gairdner, a few years ago, recommended, in the *Edinburgh Medical and Surgical Journal*, what was termed "an improved apparatus for the inhalation of vapour in the cure of diseases." It consists of a tea kettle, or a vessel of analogous form, partially filled with hot water, which is kept boiling by the flame of a spirit lamp placed under it. From the upper part of the vessel a tube issues, which is connected with a longer tube in such a way as to be capable of being bent at different angles, to adapt it to the posture of the patient. "The extremity of the long tube is wrapped with a piece of linen, to prevent the heated metal from burning the patient's lips. It is then received into his mouth, and he inhales into his lungs the steam generated by the boiling, mixed with a large quantity of air, which enters freely by perforations in the top of the kettle. The whole apparatus is constructed of tin, and may be made at a moderate price. The following directions are given to be observed in the use of it:—

"The lamp is to be taken out, and a quantity of hot water put into the kettle to warm it, and poured off again. The kettle is then to be filled about half full of water, quite boiling. If, in consequence of the neglect of these precautions, the temperature of the water is under the boiling point, the lamp will not have power to make it boil.

"The issue of steam is regulated by the lamp, which, if properly trimmed, ought just to produce vapour of the requisite degree of heat. By shortening and compressing the wick, or by lengthening and

dispersing it, the boiling may be repressed or accelerated, and the vapour received into the lungs rendered cooler or hotter according to circumstances. The extremity of the long tube must be well wrapped with linen before it is used, in such a way as not to obstruct the tube, while it defends the lips from the hot metal.' ”

A simple and convenient apparatus, as well for inhalation as for conveying vapour to the surface of the patient's body, is that already described as the one recommended by Dr Murray: suitable precautions being adopted to protect the patient's lips and mouth from the end of the heated metallic tube: this would be done most effectually by having a mouth piece of polished wood adapted to the end of the tube.

The apparatus used by Chaussier differs somewhat from the one just alluded to, in the vessel having a funnel-shaped top, opening into a tolerably large pipe which passes off obliquely, and of such a length as to admit of its introduction into the bed under the clothes, and thus conveying the vapour to the body of the patient. The boiler, or body of the vessel, is placed on a small fire or furnace, by which means the water is sufficiently heated for the elevation of vapour, and its supply as long as is requisite. Fresh water can be introduced through an opening in the top of the vessel, which at other times is closed with a cork. Should it be necessary to boil the water over ignited charcoal in a brasier, or furnace as it is now called in domestic economy, care must of course be taken to place the fire in a chimney place, and to insure also a free upward current of air to carry off the fumes which, always injurious, would be particularly prejudicial to a sick person.

The arrangement of the bed and bed clothes, so

that the recumbent patient shall have the full benefit from the application of the vapour, is quite simple and easy. A few bent hoops, fastened together at certain distances so as to allow of being placed over him, their ends resting on the bed on each side of the patient, and then covered over with sheets, or blankets, or an oil cloth and then sheets, will make an arched box completely enclosing the patient. It is easy to let the clothes fall down over the two ends of this frame so as to protect the lower extremities, and the shoulders and neck from the air, and allow of the complete application of the vapour to these parts as well as to the rest of the body. It will be more convenient to place under the patient, who is presumed to be at the time entirely naked, a piece of oil cloth covered by a sheet. The advantage of this is, that after the operation of bathing is over, the hoops and their covering, and the sheet and oil cloth being removed, the bed remains dry and comfortable, and the patient is not subjected to the risk of catching cold from cold moisture adherent to the bed and clothes. In place of the oil cloth, if not obtainable, a thick blanket may be employed. The vapour ought to be introduced at the foot of the bed so as to be gradually diffused from the lower extremities up to the trunk; by this means the vapour which first issues from the pipe, and which is the warmest, will be applied to the feet and legs, the medium temperature of which is less than that of the rest of the body.

For chronic maladies, where the patient is able to sit up, or for the purposes of domestic hygiene, the following simple contrivance will be found convenient. It consists of a wooden box, in height about

five feet and of nearly a cubic form, in which the bather enters and seats himself. The head is allowed to protrude through an opening in the top, and the vapour is prevented from escaping by cloths folded or drawn close to the neck. When it is thought proper to have the head also enclosed in the bath, the opening is to be enlarged by withdrawing a slide, and then a box is to be fitted over this, large enough to enclose the head: a frame work covered with oil cloth or double canvass will answer the purpose.

The vapour is introduced into this box by various means. At thermal springs of a high temperature, it is sufficient to place the lower part, which we may presume in such cases to have some holes, over the hot water, the vapour from which enters freely into the box. In other places the vapour can be introduced by means of a tube entering the lower part of the bath and communicating with a boiler in the manner already mentioned; or in imitation of the Russian fashion, water might be dropped or showered in limited quantities on non-combustible bodies made red hot, such as stones or iron balls, in a closed case, from which the vapour could be conducted by a suitable pipe into the bathing box. This last is a convenient modification of vapour bathing, inasmuch as it allows us to vary the temperature, which will be proportionate to the quantity of water converted into vapour in a given time.

The best apparatus for this purpose is the one used at the celebrated establishment of Messrs Jurine and Tryaire in Paris. It consists of a small copper case of a cubic form, in which, by an opening on the side, a red hot brick is introduced. In the top opens a vertical pipe, which communicates with a small cistern or reservoir of water. The water is allowed to pass in

the desired quantity by means of a stop cock, which at any time is only in part turned. A small handle and a quarter of a circle on which it turns serve as a regulator, and indicates the quantity of drops of water which falls in a given time. The water, at the moment of its falling on the hot brick, is converted into vapour, which passes by a horizontal pipe attached to the copper case, into the lower part of the side of the bathing box, and ends in the fashion of the top of a watering pot, flattened and turned downwards directly under the seat of the bather.

It has been ascertained by experiments that by letting fall sixty drops of water per minute, in a small apparatus like that just described, the bathing box is kept at 90° Fahrenheit; and as the regulator points out the requisite opening of the spout for this purpose, it will be proper to begin with this, and then gradually turn the cock until the desired heat is obtained. Of this last we assure ourselves by a thermometer, introduced into the upper part of the bathing case, and the globe of which is immersed in the vapour.

In the apparatus used by Dr D. T. Coxe, after the plan obtained from Mr Whitlaw, and the invention of which was claimed by the latter, “the vapour, generated in a boiler, escaped through a bent tube, furnished with a stop cock, into a small basin or receiver in the lower part of a box. The top of this receiver, into which herbs or other articles were placed, as well as the upper covering of the box was perforated, and allowed the free ascent of the medicated vapour into the upper or curtained part of the contrivance where the bather sat, and either inhaled the vapour, or had it merely applied to the surface of the skin, according

to the situation of his head, whether within or exterior to the inclosure.”

In the work of Assalini already referred to, the curious reader will find drawings and detailed descriptions of various apparatus for the use of general and local vapour bathing. In principle these are not very different from that already described. In the upper part of the chief box, besides the opening for the head, he has one or two if necessary, for a hand or both hands of the patient to be put outside, in order to grasp a tube which is continuous from another smaller opening, and serves to convey the vapour to any part of the face, as to the ears, nostrils, or eyes. The lower part of the bathing case or box has in it a kind of joint or foot stool, open at top and lined with tin, so as to admit of the introduction under it of a little box with a heated brick or stones. Under the seat, which may be of open work or perforated, heated bricks or stones can also be placed. These are precautions more necessary in winter, and especially if the patient be chilly and complain of cold feet. A convenient means of supplying heat is to have an earthen vessel, fire proof, with the top perforated into numerous holes, and the handle hollow and so large as to admit of rolling through it into the body of the vessel small balls of iron of an inch in diameter. This is used for sulphurous fumigations as follows: the patient being supposed to be in the bath with only his inner garment on, his neck well covered, and a wide collar extending from this part to over the shoulders; a portion of sulphur is projected into the earthen vessel, usually a dram of the flowers at a time; and the combustion is kept up by introducing in succession through

the hollow handle two, three or four red-hot balls. A little water is to be introduced by the same means, which being vaporised absorbs the sulphurous particles, and prevents the respiratory passages from being offended. If the vapour of common water, or that of sea water, or of any other medicated fluid is desired, the water or solution is to be poured into this little furnace, which in all cases is slipped into the bathing box under the feet or seat of the patient. Fragrant resins, &c. can be burnt in the same apparatus.

For the local application of vapour, a simple method consists in having a boiler with a tin covering, from the upper conical and open extremity of which is a tube of the desired length. This may be very conveniently made of leather, and to its extremity is attached either a cap to fit the head, if it be desired to apply vapour to this part, or a funnel when an engorged and indurated mamma is to be subjected to the operation of steam, or a box of the requisite shape to inclose a joint, &c.

In many houses the steam from a kitchen boiler might be very readily conveyed to the bath room above, and retained there in a box or frame covered with oil cloth or even linen, similar to that just described. For this purpose it would be sufficient to adapt a funnel shaped lid to the boiler, the summit of the former opening into a tube long enough to extend to the permanent pipe, in the chimney or wall, which passes up into the bath room. This pipe, when not in use, can be kept clear of smoke, dust, or other obstructions, by slides at each end. We might, in fine, have it then in our power to adopt very nearly the plan recommended by Gibney:

“ In an under apartment, a boiler having a safety

valve contains a sufficiency of water for the necessary supply; and from the centre of its semispherical cover, a tube issues to the apartment above, and opens into a hollow space eighteen inches above the floor, which is either square or circular, the surface being covered with wicker-work sufficiently strong to sustain the weight of the patient and the seat; four slight posts support a cupola, and over all is a covering of thick white woollen cloth, which is impervious to steam, and through which there are openings for the convenience of the patient and those in attendance; through one of these, at one side, the head is easily freed from the vapour, should it prove too powerful; it is also lessened in its intensity by a valve at the top, and by a stop-cock at bottom: its further admission is regulated with facility.

“When all is prepared, the vapour issues instantly into the hollow space, and gradually ascends, diffusing a genial warmth, which is increased or diminished according to circumstances, and thus applied for a longer or shorter time, as may be deemed necessary.”

For the local application of a stimulating vapour, the following method, as described by Murray, merits notice:

“I have, in a few minutes, applied a most efficient rubifacient stimulant, or active blister, as might be desired, to old, indolent, chronic inactive diseases of the joints, to paralytic limbs, and to any part requiring a speedy stimulus. This valuable topical remedy does not cost a penny. A spoonful of slacked lime, and one of powdered sal ammoniac, are put into a saucepan, iron skillet, or a small kitchen pot, about a quart of water is added; the sleeve of an old coat, or a stocking cut at the foot, so as to be open at both ends,

saves the irksome and objectionable display and expense of machinery. One end of this homely conductor is tied round the lip of the vessel, or pipe of a kettle; the other drawn over the joint, or part of the limb affected, and bound round it with tape. Parts inferior to this, and not requiring the excitement of a blister, will be perfectly defended, if desirable, by folding round them a linen cloth wrung out of vinegar, and nearly dry,—the vessel, or pot, is then set on the fire, the ammonia soon rises, diffuses itself around the part exposed to it, and, by its duration, can be made to stimulate, or even exulcerate the surface to any extent.

“This application, whether aided by the agency of the heat, or the more permeating nature of the vapour, is undoubtedly superior in efficacy to ammoniacal liniments, or friction.”

“Whatever cloth the conductor be made of will contain and convey vapour better, if previously wet.

“I have just now learned, that for conducting the simple steam of warm water, Doctor Macartney, the able professor of Anatomy in Trinity College, Dublin, recommended a tube of double flannel.”

Sir A. Clarke's simple apparatus is described as follows:

“A chamber is formed by hoops or arches, over which a covering of leather is to be drawn. In this the patient is placed, either lying in a bed, reclining on a couch, or sitting on a chair. By means of a number of tubes, which fit one within another, and which can be carried in the pocket, a small stove with a flue is formed; one end being introduced into the chamber, a medicated fluid is then put into a small cauldron in the bottom of the stove, and ignited by the flame of a candle. The apparatus is then complete,

and the process may be carried on for any length of time. In this hot air bath, the vapour of sulphur, of camphor, of iodine, and other gaseous substances, are introduced."

I cannot terminate the consideration of the subject of vapour bathing without giving the necessary cautions and advice to my readers respecting the circumstances under which its use may prove injurious. I would, using the language of Gibney, say, "When obstructions of the principal viscera exist, from which other serious diseases, such, for example, as dropsy, indigestion, obstinate constipation, irregularity in those functions appertaining to females, jaundice, chronic affections of the head and chest, and many anomalous complaints which are difficult to classify, great care should be taken to ascertain whether local or general bleeding, together with purgatives and deobstruents, should not precede the active use of the vapour bath; for, on this subject, experience has, in many instances, instructed us, that much mischief and considerable danger has arisen from a want of the necessary precaution; and a remedy, in itself of very great value and importance, has but too often suffered in its character, by invalids entering upon its use without due consideration and circumspection; this observation, in a general sense, should be understood with reference to almost every case submitted to its influence; holding in view, that, as it is a powerful means of relief, the discretion necessary to its administration should be considerable."

It were to be wished that the itinerant *steamers* throughout the country, and their ignorant and credulous—credulous because ignorant, adherents—would take warning, and be admonished by these remarks.

CHAPTER IX.

Douching, a practice chiefly of modern times.—Definition of a douche.—Effects of, dependent mainly on temperature.—Varieties of douches. The cold douche—its utility in acute phlegmasiæ—especially beneficial in cases of excessive determination of the blood to the brain—in mania—delirium—stupor of drunkenness—from sun stroke, and in epilepsy.—When and why proper, in gouty and rheumatic inflammation of the joints.—The warm douche of the ascending kind in uterine and intestinal affections.—The hot douche—cautions in using it—in what cases beneficial—tumefied liver and spleen—paralysis—fluor albus—chlorosis—chronic discharges from the intestines, and hepatic and nephritic colics—swelling of the joints without pain or fever.—Mode of using the ascending and descending douches.—Circumstances under which the hot douche is improper and injurious.—The shower bath—its alleged advantages inquired into.—Vapour douching.

IF we except what little we meet with in Celsus and Cœlius Aurelianus, it would seem that the practice of local bathing, in the manner practised by the physicians of Italy, France, and Germany, was un-

known to the Greeks, and even to the Romans. No Greek or Latin vocabulary expresses what is now properly understood by the term *douche* (*doccia*), nor is what is said of Hercules, or, according to Cocchi, of Silenus, represented under the jet of fountain, sufficiently clear on this point. I think, however, that the advice of Celsus to any one labouring under headache, *per æstatem id bene largo canali quotidie debet aliquandiu subjicere* (Lib I. cap. IV.), contains an evident allusion to the *douche*. It is true, that the *stillicidium*, aspersion, and pouring of cold water, of which the ancients made so much use, either after the hot bath or to disperse the remains of hypersthenic disease, give us a very different idea from that which we receive by the term *douche*: hence, the one ought not to be confounded with the other.

The *douche*, properly so called, consists in a jet of water which is directed from a cistern, destined for the purpose, by means of one or more tubes, over any required part of the body; and as this water may fall from a greater or less height, so may also the size of the column be increased and diminished at pleasure, by using tubes of various diameters, but so contrived as to be always kept full by the column of water above.* A *douche* is vertical, oblique, or ascending. The oblique *douche*, or the one the jet of which forms an acute angle with the ground, is, however, that most generally employed with cold water, and may be considered as the only one necessary for obtaining all the effects desired.

It is a common error, to attribute almost the whole

* Something similar to this is the *dry pumping* at Bath, in England.

efficacy of the douches to the shock alone, estimating as of little importance the degree of heat of which the water is the conductor; whereas temperature ought to be regarded as the principal agent in the wonderful effects produced by this remedy. It has frequently been Franceschi's lot to observe at the baths of Lucca, that not a few inveterate obstructions of the abdominal viscera, indolent ulcers, or those accompanied by necrosis, and other similar affections, after having resisted a protracted use of the douche below 100 degrees F. (30° R.), have been rapidly removed by a more elevated degree of heat, although the impetus of the water was the same in both cases.* It must then be conceded, that the efficacy of douches is, in a great degree, referrible to the action of the caloric, rather than to the mechanical impression.

Douches, though applied to a particular part of the body, act on the same principles which govern the effects of baths; and hence, they are susceptible of the same division as the latter into *cold*, *warm*, and *hot*.

The douche may be used so cold as to be near the point of congelation, when we want to procure a diminution of excessive excitement, as in *phrenitis*, *mania*, *otitis*, *ophthalmia*, and, finally, in all those cases where the head shows the predominance of that state by which the whole system is affected. With this understanding, the saying of Celsus is very true, that nothing is of so much service to the head as cold water, *capiti nil æque prodest atque aqua frigida*. This assertion must, however, be received with some reservation. Little benefit can be expected from either immersing the head or receiving a douche on it, when

* *Igèa Dei Bagni*, &c. di Giacomo Franceschi. Lucca, 1815.

the headache is caused by, or accompanies, dyspepsia. Where, on the other hand, much local determination, and arterial and even nervous excitement prevail, we may hope for great advantage from the remedy. Fontana relates two cases of melancholy delirium cured by cold applications to the head, after all other remedies were found unavailing.

Dr Southward Smith, in his valuable work on fever, speaks in high terms of what he calls the *cold dash*, which is in fact a cold douche, as one of the best means of subduing violent pain of the head with determination of blood to this part, in fever. He directs the patient to be seated in a large tub; and a man standing on a table beside this vessel, at as great an elevation as his arm can reach, pours upon the naked head of the patient a steady but continued stream of cold water from a watering pot without the nose. The stream is made to fall as nearly as possible upon one and the same spot. At first the elevation must be slight, for the shock is too violent if the stream be poured at once from the highest point.

In the apoplectic stupor of drunkenness from distilled liquors or opium, or from sun stroke, and also in epilepsy, a cold douche directed on the head and nucha is one of our best remedies. By abstracting the morbid heat and diminishing the caliber of the vessels, it thus relieves the pressure on the brain and the capillary congestion causing or associated with this morbid state. But it is an error for us to call in such cases the cold douche a stimulant. By lessening the amount of two oppressive stimuli, an inordinate quantity of caloric and of blood, it gives relief just as venesection often does under similar circumstances.

Seeing the dependence of violent convulsive move-

ments of the muscular system on unduly excited brain and spinal marrow, we can have no hesitation in freely using the remedy in question, in convulsions not arising from a visible or evident irritant, such as of the gums and worms in young children, punctured wounds, or spicula of bone and the like, in subjects of all ages. In these last cases, high excitement of the brain transmitted to the muscles is but sympathetic and in a manner temporary; and even though we should induce a powerful sedation of this organ, we but indispose it for the time being from receiving and transmitting with its customary promptitude the remoter irritation. We cannot destroy its character of a recipient of sensation and irritation, and it is purely in virtue of this office, and not owing to its own organic lesion, that it is unduly excited by injuries of other parts of the sensitive circumference. In these cases the warm bath, as already indicated, will be our best remedy.

When satisfied of the propriety of using the cold douche in certain convulsions, we should direct the column of water first on the occiput and nucha, and then down the course of the spine. In *erotomania* such a measure would be productive of very tranquillizing effects.

On occasions of great cerebral excitement and convulsive movements, with, at the same time, coldness of the skin, especially of that of the extremities, the patient might be put in a warm bath while the cold douche is applied to the head. By this means the system is subjected to two counter forces, each acting beneficially on the parts to which it is applied: the warm bath on the cutaneous capillaries, filling them and proving revulsive; the cold douche on the vessels of the brain and head, generally diminishing the

intensity of their action and causing a real sedation. This may be called part of the perturbing treatment, remedial in the particular exigency, but persisted in or attempted at other times would be injurious, as opposed to the sympathetic and harmonious action of the various parts of the animal economy with each other.

When we desire to make local applications of cold water, as already recommended (chapter III.), douching will be found an efficient means of carrying our plan into effect. If the skin of the part affected be painful to the touch, the douche ought not to come from any height. The general principles governing us in its use are the same as those, which have been already mentioned as proper for the cold bath.

Much discussion has been entered into respecting the cold douching of a *joint affected with gout or rheumatism*, pending the violence of the inflammation, and when the part is hot, red, and very painful. The question was so much obscured by the notions prevalent respecting the gouty diathesis, that no very impartial judgment could be formed by those who could only see a peccant matter as the cause of gout, which if not fixed in the extremities would be conveyed to the stomach or head. According to these pathologists, it would be the height of madness to drive in by cold the disease so happily fixed in the feet or hands; though it is somewhat difficult to reconcile this repellent effect of cold with its alleged tonic and stimulant powers: and yet both opinions have been admitted by the same persons. After all, the explanation of the manner, in which a man labouring under a paroxysm of gout is affected by cold applied to the inflamed and swelled joints, is easy, and at the same time in accordance with the principles which I have laid

down respecting the sympathetic and secondary effects of the cold bath. Let us first advert to what takes place in healthy persons consequent on the application of cold water to the lower extremities. Some persons, and they will be found among the sanguine and robust, and in those whose animal heat is great, feel refreshed by a cold pediluvium, and are altogether more comfortable; others, to whose feelings it is even grateful, uniformly complain, after its use, of either headache or a tightness or pain in the breast; whilst a third party suffer from pain or cramp of the stomach and disorder of the bowels. These different effects are often dependent on primary constitution, and often on the digestion and vigour of the circulation. A weakly person, whose skin is habitually cold, and who is subject to nervous attacks and spasms of the stomach, will be liable to an aggravation of some and renewal of others of these unpleasant affections, by immersion of the feet in cold water. But even the same person will be differently affected by this means, according as he is greatly excited, or depressed and enfeebled by artificial and morbid causes. A man in the height of a drunken fit will be partially sobered; and experience rather pleasant sensations by a cold douche directed to his feet, or by a pediluvium. The same man would, if the like application were made when he had become sobered, and was suffering from the languor which follows excessive excitement, very likely complain of pain in the stomach or head, or be thrown into a chill, which would be the beginning of a febrile paroxysm.

In none of the cases which are here supposed, is there the slightest reason for believing in the transfer of any morbid matter or metastasis, or of irri-

tation. The effects depend on the sympathetic reception by the great viscera of the impression made on the extremities. Precisely in the same way is a person with gout affected by cold applied to the inflamed joint. If inflammation be just begun or on its rise, and the stomach and circulation much excited, then will pumping or pouring cold water, cold douching, on the part, be attended by a reduction of vascular and nervous excitement, and a feeling of relief and comfort to the patient. Or if we can so graduate the douching as just to bring the part down to its healthy temperature without sedation of it, and consequent sedation of the stomach, the cold will be beneficial. But should the inflammation of the joint be on the decline, or have never been very great, and the stomach not heated and phlogosed, and the circulation languid, then would there be danger of cold douching giving rise to cramp in the stomach and excessive prostration of the nervous and vascular systems. But there is nothing peculiar or specific in the phenomena of this case. Cold water thus applied to a gouty joint has similar effects to those from cold water taken into the stomach; refreshing and grateful, if there be superfluous caloric and undue excitement; sedative and benumbing, if the organs are in a state of exhaustion, or so nicely balanced that the least reduction of excitement in one part shall be productive of depression in all, and especially of nervous debility.

The absurdity of the advice which would recommend a person to swallow cordials and other stimuli to protect the stomach, while the gouty foot is placed under a cold douche, ought to be too manifest to require notice, did not some physicians seem to think that gout was a peculiar mobile and mischievous sprite against

the approach of which the stomach must be protected while they drive it out of the feet. The good or the harm from applications, of whatever kind, to the extremities in this disease, will mainly depend on the direct sympathy between them and the stomach. The cases, requiring the use of sinapisms to the former, constitute no exception to this principle. The stomach labours under any thing but excess of action or phlogosis at the precise juncture, when the skin and extremities are cold, whatever condition it may have been in before, or may be directly after; and if we rouse the sensibilities of these last by sinapisms and other stimuli, the stomach is certainly not affected at the time by reverse sympathy, however we may, substituting one speculative phrase for another, talk of drawing the irritation from this organ or the head to the feet; just as those before us spake of drawing down the gout bodily, or the morbid humour on which it was alleged to depend, to the same parts.

The cold douche is useful in all those circumstances in which we wish to lower the excitement by a sensible abstraction of heat. To this remedy alone Franceschi attributes the cures which he obtained of excessive, sanguineous, and mucous discharges. In such cases, however, it is necessary that the spout, like cold bathing, should be continued for some time.

Uterine hemorrhages, fluor albus in its first stage, pruritus vaginæ and hæmorrhoids, will all be checked or cured by the cold douche.

Hot douches are principally had recourse to in diseases of an asthenic nature, and which from their duration acquire the name of chronic.

If we except the ascending douches, adapted chiefly to asthenic uterine, or intestinal affections, and which

ought never to exceed 98 degrees F., and those which we use to stimulate the brain and medulla spinalis, as in hemiplegia, by applying them to the cervix, to the back or the os sacrum, when it is necessary, they should be about 100° F. and no more; we can never have a hot douche of much efficacy if it be not from 106° to 112° F. (33° to 35° R). This degree of heat, which cannot fail to produce the greatest derangement in the parts above mentioned, especially in sthenic subjects, agreeably to the opinion of Galen, *calidarum aquarum usum noxium esse capitibus natura calidis*, is found to be indispensable when we want to overcome morbid congestions in the abdominal viscera, to revive the languid action of the stomach and intestines, and in all those local affections that require either the detersion of an indolent ulcer, or the exfoliation of bones attacked by necrosis, or the resolution of any engorgement that may have its seat in the glandular system.

The maxim that hot douches ought only to be adopted in asthenic diseases, or to correct or heal hyposthenic local complaints, has been generally recognized. If next we proceed to inquire into the hour of the day best adapted to the use of this remedy, and the duration of its employment, we shall find that, excepting the douche applied to the head, and that to the various digestive organs, which latter should only be used when the stomach is clear of food, it may be had recourse to at any hour of the day; though, if a choice can conveniently be made, the morning will be found the best time, as that in which the system is endowed with the largest share of susceptibility to the impression of different stimuli. Experience teaches that the internal douches may be used even

in the afternoon without any injury resulting. The same may be said of spout bathing to other parts.

The period during which the douche may be used will depend on the condition of the patient, or the nature of the disease itself. The most usual lapse of time is from twenty to thirty days; but we often meet with diseases, which, not having yielded to the number of douches indicated, were finally overcome by a more protracted perseverance in their use.

The duration of each douche may be from a quarter of an hour to an hour, daily, depending entirely on the respective constitutions of the patients and the sum of their strength. Those who prolong it beyond measure, are often liable to asphyxia, vertigoes, and other inconveniences, which commonly vanish with a suspension of the remedy, or by simple exposure to the open air. In general, when we use hot douches, the time of desisting from them ought to be that, in which perspiration being converted into a copious sweat inundates the whole surface of the body, and trickles in large drops from the forehead.

On discontinuing the douche, especially after it has been applied to the abdomen, great benefit is derived from entering a warm bath, to moderate, in some measure, the excess of heat which occasionally produces for some time a disagreeable sensation in the affected parts.

I have been the more minute in describing the process of spout bathing, and the states of the system and nature of the diseases in which experience has proved its efficacy, from its being a method of bathing on which the English physicians have laid little stress; but which the almost concurrent testimony of the most enlightened continental ones to its singular

power and utility ought to lead us to adopt, and apply to a circle of local and general diseases of a very untractable character. The only natural hot spout bath, or douche, which I have ever seen in the United States, is at the Hot Springs, in Virginia. It is of the temperature of 103 degrees of Fahrenheit. But it is very evident that this mode may be practised with very little trouble or expense in the houses of individuals, as well as all public establishments for bathing. A common tea kettle filled with hot water, may be made to answer the purpose; or if the spout bath is to be long continued, a boiler, such as is used in wash-houses, may be very readily filled up, so as to give a proper supply and fall of the warm or hot water on the body of the individual, or any required part of it. When, however, I point out the facility with which every head of a family can provide a proper apparatus for this purpose, let me not be understood for a moment as intimating the propriety of the general or indiscriminate use of the remedy, without professional advice and superintendence. The very activity of this agent is sufficiently indicative of its pernicious effects, when its use is not properly timed and regulated.

I shall conclude this part of my subject by a more particular specification of the different maladies in which the hot douches have been found singularly efficacious, and an indication of the cases aggravated by them.

In *tumefactions* of the viscera, without fever or pain, they may be freely applied over the affected part. In simple *physconia*, whether produced by enlargements of the liver or spleen, without phlogosis, the remedy often entirely relieves, especially if

alternated with warm bathing. It is also highly proper, indeed necessary, to begin with the administration of some purgative medicine, and repeat the same after a few days of spout bathing. In that state of the body termed cachectic, the consequence of derangement in the stomach, liver, and spleen, among the residents of marshy countries, and distinguished by a pale or sallow complexion, puffy skin, swelled extremities, languor, and disinclination to motion of any kind, this kind of bath often acts like a charm. It may be used on different parts of the abdomen, or occasionally on the chest and along the back.

In *paralysis*, where we may hope that there is little alteration in the nervous structure of the brain or spinal marrow, and where the patient thus afflicted is not of a plethoric habit, nor liable to great determination of blood to the head, the hot douche applied alternately to the head, nape of the neck, and along the spine, is often our only resource. In nervous exhaustion and debility, where torpidity has taken the place of *erethismus*, or morbid sensibility, this remedy is often of great avail.

In diseases of the *uterus*, depending on atony of that organ, as in *fluor albus*, unaccompanied by heat, *pruritus*, or tumescence of the affected parts, but simply characterized by languid circulation, and pallid and cold skin, and universal languor, we have much to hope from the hot douche, either descending and applied to the os sacrum and over the hypogastric region, or ascending and directed to the vagina and os tincæ. *Chlorosis* might, under proper restrictions, be materially benefited by the same remedy, applied in the same way.

Similar advice may be given in reference to the

mucous and *muco-sanguineous* discharges, of a chronic nature, from the intestines, and to *hepatic* and *nephritic* colics. The douche is to be in such cases applied alternately to the abdomen or lumbar region, and in the form of enema.

In the *Dictionnaire des Sciences Medicales*, under the article *Douches*, which by the way is very meagre in details and contradictory in its positions, we read of a case in which an ascending douche of simple warm water was eminently serviceable. The subject had abscess of the liver, which, owing to adhesions to the colon and ulcerations of this intestine, was discharged by the natural outlet. He was thought to have entirely recovered: but after a while he began to suffer daily, about four or five hours after a meal, from colicky pains, followed by purulent discharges. With these were associated every evening a slight chill and fever. He was cured by the means just mentioned in the course of eight or ten days.*

* The ascending douche is chiefly applied to the rectum, vagina, and perineum. The tube conducting the water is terminated by a spout with one or more openings. The patient being seated in a suitable manner, the tube is introduced into the rectum, or what is thought better, is brought to within a short distance of its orifice. In this case the column of fluid acts with sufficient impetus to overcome the resistance of the sphincter of the anus, and enter even some way into the intestine. An application like this of warm or even hot temperature to the perineum would be worthy of trial, in cases of stricture of the urethra and enlargements of the prostate gland.

When the descending douche is applied to the abdomen, the muscles covering its viscera ought to be as much relaxed as possible. With this view the patient is to recline on a straw mattress covered with oil cloth, his head a little raised and inclining forwards, the legs half bent on the thighs, and the arms extended along the body without effort.

If the back or loins are to be douched, the invalid lies with his face downwards: if the douche is to be applied to the nape of the neck,

In swelling of the joints, without redness and pain, whether rheumatic, gouty, or scrofulous, after the subsidence of fever and suitable cleansing of the digestive passages, no remedy can compete with the hot douche, perseveringly used for a length of time, and alternating with friction.

The use of the hot douche is contra-indicated, and ought to be abstained from, during the menstrual or hemorrhoidal discharges, and in all hemorrhages; or in persons prone or liable to sanguineous discharges, whether from a sanguineous temperament, plethoric habit, or other causes. In fine, all diseases of an inflammatory character will be aggravated by the use of the hot douche.

Midway between affusion and douches is the shower bath. Some have laid great stress on this remedy, as if it had effects entirely different from the common bath. As far as regards sensation, the fact may be admitted; but in reference to the ultimate effects, depressing when cold, exciting when hot, we cannot recognize any marked distinction between the bath by shower and that by immersion. They who insist on the tonic operation of the cold bath, and yet are aware that weak persons often cannot bear the shock from it, nor react readily after its use, think that the shower bath is less severe and more stimulating. There can be no doubt that the circumstance of the water applied to the skin by drops, and coming in contact with this surface at several points rather than covering at once the whole surface, exerts a some-

the person should kneel on a cushion, and lean his head on a chair with his forehead resting on his hands. If we are to douche the head or shoulders, or knees, the posture is to be a sitting one: the same for the hands, which are to be extended on the knees.

what peculiar impression on the nervous system; and also that the irregular abstraction of caloric by this means will create a kind of perturbation in the animal economy. But these effects are very temporary; they do not last even during the short period of the shower bath; they are chiefly experienced when the water first reaches the skin at numerous points; but the shower continuing, and the whole skin completely wet, the shower is little different from the pour of water, or affusion.

They who think that the instinctive shrinking and shudder caused by the first shower of cold water is evidence of stimulation, and that therefore we need not be apprehensive of the person being chilled by the bath, or otherwise depressed, must have formed their opinion on speculative grounds, and strangely neglected to observe the effects produced by this kind of bath. These will be found nearly identical with those from immersion and affusion.

In the surprise bath, as the shower suddenly and unexpectedly given to a maniacal person during the height of his paroxysm has been called, we recognize a means of allaying cerebral irritation, as well as vascular excitement often associated with it. The chief advantage of this, or of affusion practised from a height, is its more ready employment in the case of an insane person than immersion by the common bath would admit of. Where, however, one is not very particular on the score of appearances we can, as in the case related by Currie (*Medical Reports*), have recourse to this last method, by causing the maniac in the height of his ravings "to be thrown headlong into the cold bath." This case was of a man insane from excessive drinking. Armstrong relates his hav-

ing obtained in this disease the like good effects from cold affusions on the head.

The great advantage of a douche is, that in such cases of excessive excitement of a particular organ, we can direct the cold on the part without wetting the rest of the body; and still more, we can, if necessary, and no doubt the practice would be an advisable one in *delirium tremens*, use the warm bath at the time. In other circumstances, also, we can, while the cold douche is being poured on the head, without losing time, apply counter irritants, sinapisms, and blisters to the extremities. In fine, we have it in our power by this means to relieve excessive partial heat by decided partial cold; and thus procure at once an abatement and cure of the local morbid excitement with less expense of power and less risk than if the agent were applied to the whole surface. The laws of sympathy are not altered on these occasions; but their range is more limited. In the case of inflamed stomach, for example, the sympathy of the skin is evinced, not by general heat and burning sensation over the whole of it, but merely of that portion covering the epigastric region. Now were we to apply the cold bath by affusion or immersion in this case, there can be no doubt but that the sedative effects exerted on the entire cutaneous surface would be felt in the stomach: there would be diminished excitement of it, and less burning at the epigastrium; but at the same time, the skin generally would be too much depressed in its functions, and other disturbances might thence ensue. On the other hand, when we make the local application of cold by cloths, or ice, or by douching to the epigastrium, we operate more immediately on the diseased stomach, and mitigate the symptoms; but in

doing so the rest of the skin has not its temperature raised; it is not excited by the douche; the remedy does not cool the epigastrium and heat the skin generally. But it allays the gastric inflammation which was opposed to the regular performance of the digestive functions, and thus favours the more uniform distribution of heat throughout the animal economy. The douche, or corresponding cold application, is still a sedative to the skin at large, but not equal to the general cold bath; because, until the superabundant heat of the epigastric region be carried off, the cutaneous surface generally does not begin to respond to the impression made on the part. When the epigastrium has so far lost its heat as to be in a state of beginning sedation, the skin will at this juncture sympathize with it; but it is just at this moment, that we have it in our power by withdrawing the douche, to arrest farther sedation, and thus save the greater portion of the skin from being thrown into a state not required by its previous absence of excitement. These observations will be found of no little value in our treatment of many of the phlegmasiæ, or cases of local determination, by the cold bath. They show that under whatever circumstances we employ cold as a remedial agent, the principles governing us are the same, and that we are still guided by them, and not acting empirically, when we apply cold water to the head or the epigastrium, or to a joint, when these parts are in a state of increased excitement or inflammation, even though the rest of the skin not covering them be cold, or in a state of perspiration.

Dr Armstrong attaches some importance to the daily employment of the tepid (warm) shower bath in pulmonary consumption, the water being strongly

impregnated with salt. Elsewhere, in his essay on this disease, when speaking of this kind of bath, he says, its temperature should rarely be beyond 94° Fahrenheit, and that the patient should seldom remain in it longer than a quarter of an hour. The directions are well timed, but one cannot help regretting to find such vagueness of language to designate a particular variety of bath, as is made use of by this intelligent writer, when he calls a decidedly warm bath, tepid.

Douches of vapour may be made by directing a column of vapour, by means of a suitable pipe or tube from which it is projected with considerable rapidity, and a kind of percussion upon any particular part of the body. This column is measured, as in the case of water douches, by the size of the spout, which is fixed upon the end of the tube, in place of which the head of a watering pot may be substituted. The two varieties of this kind of douche will be the lateral and ascending. They are applicable, according to their temperature, to the treatment of the same class of affections with the warm and hot water douches.

Assalini gives a representation of the contrivances, by tubes and spouts of various sizes, by which vapour douching may be practised for the eyes, ears, nostrils, and for the vagina and rectum. At this time, in addition to his many alleged ingenious apparatus, and patent methods of using galvanism and electricity, M. La Beaume, of London, announces a new means of applying vapour, in the following strain:

“Reflecting on the extraordinary cures of internal diseases, which have been effected by the medical powers of simple vapour externally employed, I am decidedly of opinion, that the internal exhibition of

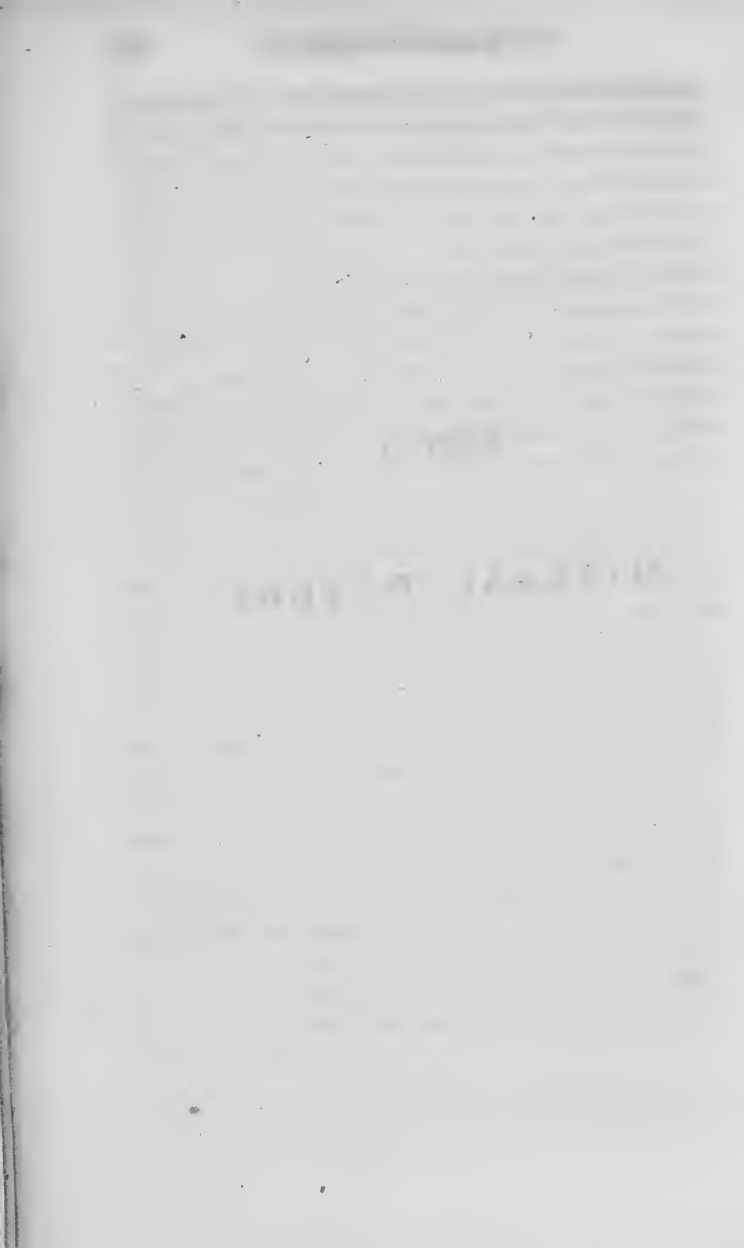
this accredited and patent remedy will accomplish far greater good in cases which injections cannot reach. I have, therefore, been led to invent and construct an apparatus on a new and simple plan for the internal administration of vapour to the intestinal *canal*, the *bladder*, and the *uterus*. This small and convenient machine is so portable, that it can be conveyed in the coat pocket without the least risk of damage, and is so easy of application, that it can be employed either by the practitioner, the nurse, or the patient himself: it excites only pleasurable feelings, and can be used with perfect safety; for the temperature of the vapour can be constantly regulated by the unerring test of individual sensibility.

“As I intend to publish a small pamphlet on this important subject, in which I shall elucidate the construction of the machine by a plate, enumerate the cases in which it is beneficially applicable, and give suitable directions for its use, I have here only to add, that I anticipate from its employment the greatest advantage in *acute and chronic diseases, difficult parturition and suspended animation*; and that the success, which will attend this improvement in the application of vapour, will be highly beneficial to mankind. The introduction of this machine to the public notice will also be still more gratifying to me, as it will be used under the direction of gentlemen of the medical profession.”

M. La Beaume seems to be of the Dominiceti school, in the variety of his vaporous and other kindred inventions, and the astonishing nature and number of his cures!

PART II.

MINERAL WATERS.



CHAPTER I.

Discovery of the virtues of mineral springs accidental.—Great estimation in which they were held by the ancients, especially by the Greeks and Romans.—The Italians were the first to direct public attention to them in modern times.—Great pains paid to bathing establishments, at mineral springs, by the French.—Pains taken to analyze the mineral waters.—Advantages of hospitals at mineral springs.—Propriety of our state governments erecting such.—Virtues of common water.—Difference in effects between common and mineral water.—Modus operandi of mineral waters.—Precautions for invalids residing at mineral springs against hasty or excessive use of the waters.—The effects vary with the state of the system and the quantity drunk, as well as with the intervals between drinking.—Directions in case of disorder arising while using the waters.—Necessity of attention to all the other means of preserving health while at the springs.—Sleep, clothing, diet, exercise, and amusements.—Some particulars as to food of the invalid at these places.

A BRIEF sketch of the history of mineral waters, and a summary notice of their chemical divisions, utility,

and general effects, will, very properly, precede a more particular account of the springs of each country, and a specification of the diseases in the cure of which they are thought more peculiarly efficient.

The discovery of the good effects of mineral springs was, no doubt, due to accident rather than to any preconceived opinion of their merits. These once ascertained, the cures they effected were held in traditional remembrance, and induced others to try the same means of relief. The history and experience of consecutive ages have tested the correctness of early belief, and convince us, that, with suitable restrictions and reservations, a remedy so bountifully and liberally supplied by nature, is generally an useful supplement, and, at times, of paramount value to others of more prompt and energetic action.

The Greeks, whose knowledge of medicine was greater than that of the nations who had been their precursors, paid honours to warm or thermal springs, as a benefaction by the Deity, and dedicated them to Hercules, the god of strength. They made use of them for drink, for bathing, and as topical remedies. Hippocrates tells us of warm springs impregnated with copper, silver, gold, sulphur, bitumen, and nitre; and forbids their use for common purposes. Aristotle taught, that there mingles with the waters of warm springs vapours of different kinds, which constitute their chief virtue. Strabo describes a miraculous spring, to which he attributed the property of breaking down stone in the bladder, and evacuating the pieces from it. Theopompus indicated one which cured wounds. Archigenes counsels the drinking of mineral waters in diseases of the bladder, in quantity

varying from one to ten or fifteen pints. Many Greek physicians employed this remedy against elephantiasis, colic, paralysis, and nervous affections. Galen eulogises a *bituminous* and *martial* water made use of by those who were subject to the gravel. He forbids the drinking of mineral waters to those who have any *astriction, acerbity, aridity, or acrimony* of the humours.

In fine, without following the author, to whom I am indebted for this sketch,* in what some may think a mere parade of learning, it is sufficient to add, that mineral waters were a familiar remedy with the Romans, who made a habitual use of those of Italy. Horace praises the baths of St Casciano, in these lines:

“ Qui caput et stomachum supponere fontibus audent
Clusinis.”

Vitruvius, and still more Seneca, the philosopher, enter into details respecting the virtues of particular kinds of waters for different complaints. Pliny, in his Natural History, treats of acidulous, sulphurous, saline, nitrous, aluminous, martial or ferruginous, and bituminous waters. Oribasius, who lived under the Emperor Julian, speaks much of natural mineral waters; and gives good precepts for the employment of the ferruginous ones, which he recommends in affections of the stomach and liver. He gives some sketches of the spirituous waters, now called acidulous, and thinks them beneficial in disorders of the senses. Ætius, born A.D. 465, appears to have occupied himself greatly with mineral waters. He prescribes the aluminous and sulphurous for nervous and rheumatic af-

* Patissier—Manuel des Eaux Minerales de la France.

fections, and especially for leprosy, itch, and herpes. He lauds ferruginous or chalybeate waters in chronic diseases of the liver and stomach.

In all the countries over which the Romans obtained dominion, they sought out mineral springs, and more especially warm and hot, or thermal, ones, because they had experience of their efficacy in the cure of wounds. Out of gratitude to the benefits which they experienced from the use of these springs, they decorated them with edifices, the remains of some of which are visible to this day. Each fount was placed under the protection of some tutelary divinity. The priests of paganism, abusing the credulity of the invalids, invented certain religious ceremonies, which were insisted on as indispensable for obtaining a cure; and the inscriptions, still seen on the walls of some of the enclosing edifices, show that the cures performed in those times were attributed less to the efficacy of the waters, than to the kindness of the presiding god. The fall of the Roman empire was followed by the destruction of all these establishments, which the ignorant zeal of the age then regarded as heathenish and unworthy of Christian countenance and support.

In the tenth century, when medicine was more especially cultivated by the Arabians, mineral springs were held in some repute.

In France, the mineral founts were deserted until the time of Charlemagne. This prince, convinced of their utility, caused to be constructed, at Aix la Chapelle, a vast basin for himself and children to bathe in. Occasionally, he held his court, or met his council, in the bath. His death, and the division of the empire, re-

plunged France into ignorance and barbarism, and brought about the loss of bathing as well as other establishments of a still more important character.

It was only at the end of the 15th century, that physicians began to pay attention to mineral waters, and the Italians were the first to revive their ancient celebrity. In 1498, John Michael Savonarola, of Padua, composed a treatise of some length on baths in general; and more particularly on the thermal waters of Italy. Andrea Baccius published in 1596, a work on the most celebrated thermal waters of Europe, and indicated some processes by which to recognise their principal ingredients. Until then, the mineral springs were the rendezvous of gamesters and provincial buffoons; and the superintendence of the waters was left to quacks, who readily imposed on blind and superstitious credulity.

Henry IV., who, during his youth, had frequented the springs of the Pyrenees, and witnessed the abuses in the employment of so useful a remedy, sought to correct them, after his accession to the throne of France. He nominated, by edicts and letters patent, in 1603, superintendents and superintendent-generals, who were charged with the entire control over the use of the mineral waters, baths, and fountains of the kingdom. These edicts were confirmed by Louis XIV., Louis XV., and Louis XVI. Most of the mineral springs and bathing establishments on the continent of Europe are placed under a somewhat similar superintendence, and a resident physician is also appointed by the government. The properties of mineral waters were now every where studied with great industry and zeal. Fagon examined with care those of Bonnes and Baréges, in order to ascer-

tain their probable utility in the cure of *fistula in ano*, under which Louis XIV. suffered. Chirac was occupied with the waters of Balaruc, in reference to a wound which the regent had received. Already had the springs of Aix la Chapelle, Spa, Baréges, Cauterets, Bagnères, and Bourbon-l'Archambaud, drawn to them a great number of invalids and sick, who went with confidence to these several places in pursuit of health. In some provinces, certain fountains were placed under the protection of a patron saint; and, at a particular epoch of the year, crowds visited them to invoke the assistance of Heaven, and to purify themselves.

About the end of the seventeenth century, we find a great number of chemists and physicians speaking with enthusiasm of the mineral waters of their respective countries. Conrad Gesner lauded the thermal waters of Switzerland; Hoffman those of Germany; Allen and Lyster celebrated the waters of Bath and Buxton; whilst Boyle sketched a general treatise on mineral waters. In Italy the warm and hot springs of Lucca and those of St Julian, near Pisa, had a host of writers to set forth their virtues. The first had attained some note as early as the twelfth century, when the celebrated Countess Matilda built a bridge for the more easy access to them, and made other useful additions.

From 1670 and 1671, when the Academy of Sciences at Paris appointed two of its members, Duclos and Bourdelin, to make the analysis of all the mineral waters of France, down to the present time, the chemists have always been desirous of fixing, with some precision, the constituent parts of such waters, and of improving the preceding methods of minute

analysis. In 1766, Bayen indicated the means of separating the sulphur from sulphurous waters; and Monnel, in 1768, and Bergmann, in 1774, discovered the hepatic gas (sulphuretted hydrogen). To the celebrated chemist of Upsal, more than to any other, are we indebted for introducing system and clearness in the analysis, and indicating the best means for the recomposition of mineral waters. The first he contended could never be correct, unless, by means of the principles extracted, the latter could be fully accomplished. Vauquelin, Deyeux, Thenard, and Davy, have greatly advanced our knowledge of the subject, at the present time.

While the chemists were thus engaged in discovering the composition of the several mineral springs, the physicians were not backward in observing and recording their effects on the human frame, and determining the cases in which they were beneficial, or in which injurious. The French government, enlightened on this point, caused hospitals to be erected at some of the most celebrated of the mineral founts, in which the military and the poor were attended to gratuitously, under the inspection of a physician, whose province it was to see to the judicious use of the waters and the relief of the infirm. It would well comport with the liberality and humanity of some of our state governments, to erect edifices of a similar nature, in the vicinity of some of the most active and celebrated of our mineral and thermal springs. The rich invalid would find his interest in the accomplishment of such a scheme, in the precision and certainty with which the waters could be prescribed for him, after their effects had been so fully tested on a large number of individuals placed under

the entire control of the physicians; of course, in circumstances the most favourable for ascertaining the salutary operations of the remedy.

Added to this, the physician thus situated has it in his power to keep a regular record of all the cases placed under his direction; and while watching with a scrutinizing eye the good or bad effects of the mineral water, almost insensibly becomes the historian of chronic or lingering diseases in general, and of the means best calculated to cure them, or, at least, suspend for a season their fatal course. It was by opportunities of this kind that Theophilus Bordeu was enabled to present the profession with his celebrated work entitled *Recherches sur les Maladies Chroniques*; a work to which, notwithstanding the wonderful improvements of late years in pathology, instructive reference may still be made.

The epithet of *Mineral* has been applied by chemists and physicians to every water issuing from the earth, and impregnated with mineral or saline substances to such an extent as to receive a strong taste, and fitting it for a common beverage, and yet imparting to it such properties as to render it an useful agent when drunk in a great number of diseases. The term *mineral water* has been objected to as not sufficiently distinctive, since common water contains mineral substances; and hence, it has been proposed to substitute the title of *medicinal* or *medicamental*. But as there is a general understanding and sameness of opinion among all writers and medical men respecting the meaning which we are to attach to the expression *mineral waters*, it would savour too much of affectation to

attempt any innovation at this time; and I shall, of course, retain and continue to use the old term.

It is usual with most writers on mineral waters, to premise some account of the virtues of common water, as an article of diet and as a medicine. There is unquestionably no fact in hygiene better established than the salutary effects of simple water. This must be familiar to every physician the least conversant with his profession: and now we may add, thanks to Temperance Associations, that, happily, the people at large are becoming fully persuaded of it, and act up to their belief in giving it that preference over all other drinks which God and nature, their own unsophisticated tastes, and instinct of preservation so clearly point out. I need not repeat the written authorities in our profession to this effect. The reader, curious to see the array of names and opinions on this subject will be gratified by consulting the *Journal of Health*, No. 3. Vol. II. It need then excite but little surprise if some writers are found who seem disposed to refer all the good effects of mineral waters to mere dilution by their aqueous portion alone, while others qualify somewhat this position by adding the additional agency of temperature. "As an example of the similarity of operation in very different waters, and which may certainly in a good measure be ascribed to the mere liquid, we may mention, that transient determination to the head is often produced in delicate habits by the first exhibition of any of these waters. We find this circumstance noticed in the purest springs, and those that are the most free from foreign contents, as well as in every other water."

The author of this remark, Dr Saunders, then proceeds to enforce it, by adducing the testimonies of

different writers, to show that the waters of Malvern, Bristol, Lauchstadt, and the hot Caroline baths in Germany, all cause a certain degree of drowsiness, with vertigo, and occasionally a dull pain in the head—though these several springs differ much from each other in their chemical composition—that of Malvern containing no metallic principle. I have often found a half-pint tumbler full of common hot water produce the same effects. The opinion of the celebrated Vacca Berlinghieri, of Pisa, is corroborative of that just enounced. “Those are mere visions,” says he, “of even the most esteemed physicians, by which it is pretended to explain and insist on the salubrious properties of waters from their fixed or volatile principles, and by what mechanism each different mineral water accomplishes the cure of various diseases. The fact is, that hot mineral waters, although, according to chemical analysis, they may differ in their ingredients or in the quantity of them, all coincide in curing the same diseases, with the sole variation of being, in different cases, one less efficacious than another.”*

In fine, we are constrained to admit that there is hardly a disease cured by mineral water, that has not been removed, or greatly mitigated, by free potations of common water.

While I concede, to a certain extent, the sameness of operation and effects between common and mineral water, I cannot however admit their entire identity, as remedial agents. One very obvious difference immediately strikes us, namely, the utility of common water, or beverages consisting almost exclusively of water, with some bland substance, in fever and acute

* *Saggio intorno alle Principali Malattie del Corpo Umano.*

diseases; whereas mineral water is in such cases not simply of equivocal benefit, but absolutely hurtful. Again, in various chronic diseases, distinguished by inertia, a languid state of the digestive apparatus, and abundant mucous secretions, common water will be of little benefit; when, on the contrary, a fluid with saline and mineral impregnation will prove of decided efficacy. In fine, if I might use language nearly exploded, though sufficiently expressive, I would add, that common water taken largely as a diluent will be found extremely salutary in the *strictum* state of the system, and mineral water of equal power in the *laxum* state: the first being the remedy for impeded or obstructed secretion; the latter, the one for excess in the same function. Common water acts indirectly on the organs of the living body by neutralizing noxious or acrimonious matters, and facilitating their egress. Mineral water has a decided and independent action on the same parts, particularly on the mucous surface of the stomach and intestines, and on the circulatory apparatus by absorption. I am justified, then, from all that has been advanced, as well in the first part of my subject, on baths, as in that just discussed, in laying down the following propositions:

1st. That mineral waters, used for bathing, or douching, on a sound cuticle, act mainly in virtue of their caloric.

2dly. That when taken into the stomach or intestines they have a double operation; the one common, and generally uniform, depending on their basis, or their pure watery vehicle; the other proper and peculiar, being the effect of the saline and mineral substances held in solution.

3dly. That if used under the form of bath or douche,

the action of these chemical principles will have little or no effect except upon those parts which are deprived of their natural covering, or skin---of course no effect on the general system, except through the parts thus denuded.

The small proportion of foreign ingredients in mineral waters, compared with the quantity of the same substances prescribed in medical practice, has created surprise in the minds of some, and incredulity in others, at the alleged efficacy of the former, when the latter in so much larger doses has been attended with comparatively trifling results. In reply to this, it is only necessary to remind my readers of a few tolerably familiar principles in physiology and therapeutics. First, we know that the action of many remedial agents, chiefly of the stimulant and narcotic tribes, is primarily and almost exclusively exerted on the stomach, and by sympathy on the rest of the system. Solids, vegetable and metallic, in small bulk, and taken without much dilution, are nearly equally local, in their first effects, with the additional application to the surface of the intestines: but in either case their action is diffused by the same law of sympathy. In the second place, as the whole mucous surface of the stomach and intestines has this great sensibility to the impression of ingesta of every kind, especially those of a remedial nature, it is very obvious that the sensations produced by this means will be active, and their diffusion through the system, by nervous agency or sympathy, prompt and general, in proportion to the extent of surface acted on. Now, mineral waters taken usually in considerable quantity, so as to fill the stomach, and pass promptly into the intestines, are so applied to

these parts as to enable their saline and metallic ingredients to act on almost the entire surface of the digestive tube, and of course to produce all the effects which we could desire from such ingredients: effects not to be expected from them, even though in larger quantities, when applied but to a few points, or limited extent of surface. Finally, the experiments of late years have most satisfactorily established the fact of absorption of various substances, nutritive and medicinal, and above all, fluids, by the veins of the stomach and intestines, as well as by the lacteals, without, in many cases, these substances losing their distinctive characters—nay, farther, that the peculiar and specific action and effects of various agents are as operative when injected into the veins as when taken into the stomach. It is then hardly necessary, after such preliminaries, to draw the inference, in which most readers will have anticipated me; namely, that the absorption of the mineral water drunk in large quantities, must be prompt and abundant, and, consequently, that the different ingredients of which the fluid was the menstruum, being thus thrown into the circulation, will produce varied and decisive results, such as could not be expected from any other mode of administration.

We can now, without much hesitation, say, in the words of a writer already quoted,* “In general, mineral waters revive the languishing circulation, give a new direction to the vital energies, re-establish the perspiratory action of the skin, bring back to their physiological type the vitiated or suppressed secretions, provoke salutary evacuation, either by urine,

* Patissier.

or stool, or by transpiration: they bring about, in the animal economy, an intimate transmutation, a profound change; they saturate the sick body, to make use of the energetic expression of a modern author. How many sick persons, abandoned by their physicians, have found health at mineral springs! How many individuals, exhausted by violent diseases, have recovered by a journey to mineral waters, their tone, mobility, and energy, to restore which, attempts in other ways might have been made with less certitude of success!"

After all, we find physicians, who, while they admit the good effects of visits to mineral springs, and the removal of diseases in consequence, deny still the agency of the waters in such benefits and cures, and attribute all to the exercise in travelling, to amusements, change of air, and mode of living. These are no doubt contributing, and not unfrequently all powerful causes of the relief of many hypochondriacal and nervous affections, so called. But are they adequate to the cure of chronic rheumatisms, paralyses, visceral engorgements, cutaneous eruptions, incipient anchyloses, fistulous wounds, &c.?

I wish not, from the opinions hitherto advanced, to be ranked among the number of the chemical physicians, who, having discovered the proportion of each foreign ingredient in the mineral spring, and studied its operation on the economy, pretend to determine the general effect of the compound. We may, indeed, by a knowledge of the constituent parts, predict, to a certain extent, the medicinal power of a compound: but it is only by multiplied facts, that is, by experience of its use, that we can speak positively of its virtues. Where experience is explained by rea-

soning, and enforced by analogy, we may give our confidence; and on these grounds it is claimed in favour of mineral waters.

Like every other remedy of any efficacy, they are susceptible of abuse, and of producing consequent injury. Hence these waters are generally prohibited to persons threatened with any acute disease, or who feel the preludes to it, such as chill, headach, and spontaneous lassitude; also in cases of scirrhus tumours, or those tending to internal abscesses or effusions. They are, moreover, to be employed with great caution by those with much irritability and highly exalted sensibility.

It very frequently happens, however, that an invalid, whose state would be at first aggravated by drinking from a mineral spring, if nothing is premised, will, after the use of some active medicine, such as a few mercurial purges, and, if arterial action be somewhat considerable, the abstraction of some blood, be enabled to commence taking the waters, and persevere in their use with decided advantage. In other cases, remedies of different kinds are recommended to second their action, and be employed in conjunction with them. Hoffman lavished the greatest eulogiums on milk with mineral water. In the treatment of scrofula, Theophilus Bordeu obtained signal benefit by the union of mercurial frictions with the use of the waters of Baréges. But these, and other combinations and alternations of treatment, can only be confidently recommended by physicians always residing at the springs, and intimately acquainted with all their shades of action and operation. The general rule, which may with safety be laid down for the guidance of those about to use mineral waters, is to

have their primæ viæ well cleared of fæcal and mucous collections, and to bring down, as nearly as may be, the circulation to a natural standard.

A little reflection on the part of invalids, somewhat quickened by their own former experience of the inconveniences of errors in regimen, will soon lead to a conviction of the necessity of adherence to rules, and of placing at least all the chances of cure in their favour. They ought to be apprised of the maxim universally received among physicians, that to give a medicine the fullest scope for displaying its powers, it must be taken on an empty stomach. There is no exception to this rule; nothing can entirely compensate the patient for the neglect of it. It is in conformity with this rule that we choose the early morn for giving those medicines which are to exert either a prompt and active, or a slower and permanent action on the system, such as a purgative in the first instance, and a tonic in the next. Those of one class are indeed often given in the evening, with a view to their procuring rest and sleep for the night. But where we desire to procure more lasting ease from pain, and to allay violent irritation by the frequent administration of narcotics, we find it most advisable to begin with them early in the day, and continue them in divided doses at regular intervals; and, if possible, cause them to be taken on an empty stomach.

Another medical rule in attempting the cure of disease, is to subdue inordinate action and violent disturbance of the system before we administer medicines with a view to their peculiar effects. Thus, when the stomach and bowels are highly irritated, or inflamed, we decline administering purgatives; when

there is acute pain in the head, with high fever, we withhold opium and other remedies of what are termed the class of anodynes; when the liver is acutely inflamed, we are wary in giving antibilious medicines, so called. Violent and regularly recurring chills do not justify the use of the bark if the interval be marked by symptoms of high action of the blood-vessel system generally, or of great determination to the head, liver, or stomach. All these several states of violent disease are to be mitigated at first by bleeding, either general as from the arm, or local as by cups and leeches to the head, over the stomach, &c.; also by the simple cool diluents, or watery drinks, cool air, and, under appropriate circumstances, the cold bath. Without preliminary treatment, purgatives would, so far from carrying off matters oppressive to the stomach and bowels, and promoting secretion from their inner surfaces, only serve still farther to irritate and inflame these parts; opiates would increase the pain in the head and restlessness, and even cause delirium; bark would convert the remittent into more of a continued fever, and increase the distress of the stomach and exasperate the prior existing pain of the liver.

From these and other analogous facts we learn the important truth, overlooked by the public generally, and sneered at by impudent quacks, that the operation and remedial effects of any one medicine or combination of medicines are purely relative, and depend on the state of the animal economy at the time. It has been one of my objects to enforce this view of the subject in the first part of this work, or that on the different kinds of baths; and it is my wish at present to urge it on the attention of the reader in reference to

the use of mineral waters. The successful operation of one remedy will prepare the way for that of another; as we see in bleeding, which prepares the stomach to receive a purge: this last, by clearing out the digestive canal, enables it to be suitably and beneficially impressed by an opiate, so that the brain shall be in its turn advantageously affected in consequence, and disposed to suspended activity, and allow of sleep.

Not only will a medicine be injurious or beneficial according to the condition of the body at the time, but on this last circumstance will greatly depend the particular organ on which it operates. Thus certain saline and vegetable substances will either cause vomiting or sweating, will act as diuretics or diaphoretics, as expectorants or diuretics, according to the state of the skin, its feverish heat or coldness, its warmth by clothing, or its exposure to dampness and cold. A minute dose of antimony or ipecacuanha, which when the skin is warm and well covered would cause a mild perspiration, will, if this surface be chilled, give rise to nausea. Nitre and some other salts, in the first mentioned state of the skin, cause or increase sweat; in the second, produce an increased action of the kidneys. Squills, minute doses of calomel, the blue pill, &c. will, under different states of the animal economy, either promote free expectoration—discharge from the lungs, or free diuresis—evacuation from the kidneys. In larger doses, all the medicines mentioned will purge freely, and some of them cause vomiting at the same time. Differences from this cause might of course be expected. But the invalid is too apt to suppose that the difference of effect depending on increase of dose is uniform and identical in kind. This is a great mistake. In

certain inflammations, pleurisy and acute rheumatism, we may by prescribing small doses of tartar emetic at regular intervals produce a marked effect on the disease, and even go on augmenting gradually the dose until enormous quantities are taken by the patient without his being vomited, or even made sick at the stomach. And yet every body knows that tartar emetic, as its very name implies, is the most common medicine to produce vomiting. The difference in its operation in the cases just cited, and when given with this last view, depends on two causes: first, the smallness of dose, and longer intervals between the doses, in the diseases mentioned; and, secondly, the nature of these diseases, which are essentially inflammatory. Let the first and acute stage be passed, and with it the inflammation subside, and then the tartar emetic will display its common property of causing vomiting.

Calomel in a large dose is an active cathartic; in smaller doses, as already stated, it is expectorant, or diuretic, or will act on the skin. Cream of tartar in a large dose purges; in a smaller one, and with a large quantity of fluid, it increases the discharge from the kidneys.

When disease is slow in its progress, has lasted some time, and imminent danger from inflammation and breaking up of some part of the living organization is no longer feared, it becomes *chronic*; and we are fain to attack it by means less potent and violent than those to which we had recourse at an earlier period of its invasion. A common term to designate remedies employed in small doses and for a length of time, and by means of which we hope to produce a gradual change in the diseased economy without their

evincing sensible effects, such as by purging, or sweating, or diuresis, is *alteratives*. Of all the compounds or prescriptions made up with a view to alterative effect, none can be compared with mineral waters. They combine the two chief requisites for medicinal operation: first, several saline substances in minute quantities, which can be readily received into the stomach; and secondly, such large dilution as to insure for them a ready distribution to all the organs of the body.

On this point, of ready reception of medicines by the stomach, I may be allowed, on account of its importance, to say a few words. Without meaning to disregard or undervalue the circumstances already mentioned, which modify the operation and effects of medicines, it must, nevertheless, be admitted that the main condition for their display of sanative powers is their being readily retained by the stomach; and this organ transmitting, without pain or noticeable disturbance, to the other organs the impressions which medicines produce on it. Indeed such is its close relation to all other parts of the body, that it will not often tolerate, with any degree of complacency, substances injurious or irritating to any other important organ, as the brain, the heart, the lungs, the liver, &c.

The application of all these to the guidance of the invalid who visits mineral springs, with the design of drinking the water, is obvious. He cannot hope to be benefited by it, if his stomach be either so irritated or so inflamed as to reject, or only retain with great pain and uneasiness, the mineral water which has been drunk. Should he complain of much fullness and tension about the head, or a pain or sense of stricture at the chest, pain in the side and shoulder, with furred

tongue and fever; in fine, if he labour under any acute disease, or active hemorrhage, or first and feverish stage of any malady, such as of inflammatory rheumatism and gout, he cannot hope to derive benefit from mineral waters. For the most part he will be injured by them.

Ranking mineral waters as in the class of alteratives, we must drink them with nearly the same precautions which are generally demanded in the administration of these remedies. We must begin in a small quantity, moderate doses, at regular and rather long intervals, and gradually increase it as far as the stomach will bear, and the absence of any unpleasant sympathetic disturbance of the circulation and nervous system would seem to justify. The invalid must bear in mind, that increase of dose does not insure increase of the primary effect. If one tumbler-full of water, from a mineral spring, produce a softening of the skin, or some increased discharge of urine, or a slight quickening of the digestive action, it does not follow that six or eight tumblers-full will cause identical phenomena, differing merely in degree. So far from this being the case, the person who has swallowed this double dose will be apt to complain of a load at the stomach, want of appetite, and thirst, followed by purging and quickened pulse.

What is thus said of dose is applicable to its repetition. An invalid may drink a moderate quantity of the water before breakfast with comfort and advantage, but not be able to do the same before dinner with equally good effects. He may be able to take the water both before breakfast and before dinner, and yet if he drink in the evening he will perhaps have a

restless night, and be worse next morning than he had been twenty-four hours before.

Not only then is it necessary that the invalid should have his system properly prepared before he visits the spring, or, at any rate, before he drinks the water; but it is also requisite that, when he has begun to use it, he must proceed cautiously and under good advisement, either from a medical friend, or from an attentive reflection on his own feelings. He is not by any means bound to proceed on the principle of imitation, and argue from sameness of names, when, in fact, the symptoms and disorder differ in many essential particulars. We will suppose it is a dyspeptic invalid who has just arrived at the springs. He is rather feverish and thirsty, and not without some pain in the stomach; he sees a lady pale, emaciated, and enfeebled, also dyspeptic, drink several tumblers-full of the water. Surely, thinks he, I can at least drink as much as that lady. But he is surely mistaken. The quantity which just properly excited her languid frame and torpid stomach, throws him into a fever and aggravates his gastric distress. Mistakes of this kind are of constant occurrence, and if they be made with those admirable waters furnished of an almost invariable quality by a beneficent Creator, what must we suppose are the probabilities of their occurring with the compounds, ever varying in strength and proportion of ingredients, of vile empirics? Thousands and tens of thousands with elongated visages and tortured frames can easily respond to this question.

In thus cautioning against too implicit a reliance on the reputed virtues of mineral waters, and a forced use of them, despite their causing untoward symptoms,

we ought, on the other hand, not to be too readily alarmed at some disturbance and disorder which may ensue during the course of the remedy.

The fever, which comes on while drinking the mineral water, will often readily disappear by abstaining, for a few days, from its use, and also by rest, simple water for drink, and abstemiousness in eating or entire abstinence. Much purging, with a dry tongue and thirst, will be relieved by nearly a similar course, and by the use of mild demulcent drinks. Repose of the body as entirely as possible, both by withholding the external stimulations of the senses, and the internal of the stomach, will often entirely suffice to remove all the unpleasant symptoms of irritation caused by the waters; and thus prevent the necessity of flying to physic and drugs from the shop. If the first mischief was caused by taking too much medicine from nature's fount, it does not require to be corrected by our taking that which is measured out by art. It may happen on occasions that either from beginning to drink the water before the system was prepared for it, or from the excessive quantity drunk, the stomach evinces some symptoms of inflammation. In such case, in addition to abstinence and simple diluents, the physician will perhaps deem it advisable to take a little blood from the arm, or, if they can be obtained, to have a few leeches applied over the epigastrium.

It is not to be expected of me, in this place, to repeat the prolix instructions given by most writers on bathing and mineral waters, for the guidance of those who wish to avail of these means for the restoration of their health. Sleep, diet, and exercise, ought to be conformable to the respective habits and temperaments; and a residence at springs ought neither to be

taxed with privations, nor made subservient to debauchery. The period of sleep ought not to exceed eight hours in any case, and not unfrequently six will be found all sufficient. That food, which at home was found to be easy of digestion and nutrimental, may be used at the springs; and the invalid must never so far forget himself as to imagine that the mineral water which he drinks will prove an antidote against the poison of the kitchen or the cellar. The exercise may be on foot, horseback, or carriage, according to circumstances: the two first are preferable. Attention to clothing of suitable stuff and thickness, always important in chronic diseases, is doubly so when the sufferers under them are at mineral springs. Sydenham has said, that the fashion of changing the dress with each season killed more persons than gunpowder. If, then, a selection is to be made, and change forbidden, in northern or temperate latitudes, let the invalid and visiter to mineral springs take with him and use his winter garments. On such occasions he will almost invariably find himself in situations where mountains are in the vicinity of deep valleys, and where, of course, the air is humid and cool. In fine, we may sum up in a few words, by repeating, after the great Father of Medicine, that all excesses are dangerous: a maxim every one must have fully tested the correctness of. Eating much in the evening, sitting up late, prolonged and immoderate dancing, remaining too long in the cool air of the evening, are often the causes of many unpleasant complaints, which might have been easily prevented. The passions are to be kept in check, by avoiding every exciting cause, either of the boisterous or melancholy kind: a giddy chase after pleasure and luxu-

rious indulgence, are scarcely more reprehensible than an indolent and secluded life. It must, after all, appear ridiculous, in the midst of woods and rocks, to make those sacrifices to fashion, which are barely supportable in a crowded and wealthy capital.

Without meaning to recommend to all invalids at watering places or mineral springs, an entire abandonment of tea and coffee, I must still be allowed to say, that they would all gain by the measure. To a person of a phlegmatic temperament and sluggish circulation, one not suffering from heat or pain in the stomach nor from much thirst, one or other of these beverages will often not be found objectionable; but if invalids who travel in quest of health and who suffer from palpitation of the heart or dyspepsia use tea and coffee, or from the diseases of the skin and use coffee, they must be regarded in the light of persons who consent very solemnly to play the fool with themselves.

Slow and laborious digestion, heart-burn, disordered states of the kidneys, discoloration of the skin, and some affection of the liver, often the effect of excessive eating and drinking alone, are not to be readily cured by visiting mineral springs, and keeping up the same kind of living. If they, and the remark applies to all invalids, be sincerely desirous of gaining health, they will most successfully do so by simplifying their regimen, and abstaining from all those appliances to force appetite and tickle the taste, which they had formerly used in the shape of ardent spirit, wines, and malt liquors; fried meats and pastry, green and unripe fruits.

Milk, where it can be taken either pure or diluted with hot water and sweetened, is to be preferred to

tea and coffee. Bread a day old, dry toast, or plain water cracker with a little cold butter, is preferable in all cases to hot buttered toast and cakes, fresh bread, rolls, or muffins. Butter, in its natural state highly nutritious, and with many easy of digestion, undergoes, when heated in the different culinary processes, changes which render it frequently as noxious and rancid as oil.

“Jellies, plain pudding of rice, or bread and milk, baked fruits with the omission of the pastry, are light and easy of digestion, and often constitute an important part of the invalid's dinner; but before using too great a variety of these and similar articles, after a meal of more solid food, it may be well to remember the words of the poet:

—— ‘The stomach crammed with every dish,
A tomb of roast and boiled, and flesh and fish,
Where bile and wind, and phlegm, and acid jar,
And all the man is one intestine war.’

“Water is the element, wisely offered us by nature, for allaying thirst and diluting our solid food; and the art of man has hitherto been unable to produce any substitute better adapted for the purpose. The only reasonable objection to its use, arises from its occasional hardness and impurity; these, though said to exist much oftener than is really the case, may be easily obviated by previous boiling or distillation.”

It has been very truly remarked by the writer* from whom we have just quoted, “When the stomach feels heavy or distended after dinner, a cup of good coffee is better calculated to remove these feelings and promote digestion than any quantity of wine,

* Adam Hunter, M.D. On the Mineral Water of Harrowgate. London, 1830.

or weak mixture of spirit and water, which has of late been frequently recommended, and is often taken for that purpose: *a tumbler or two of pure spring water is yet more effectual.*"

But the whole weight of reason, authority, and appeal to the individual's own experience of injury from the practice, ought to be enlisted against heavy or meat suppers. A sufficiency of bread taken at the hour of tea will prevent the necessity of any farther call for food during the same evening. If tea be drunk, rather than milk and water, it will be prudent to add to the former a large proportion of milk—nearly one half. This will be both wholesome at the time, and prevent the gnawing feeling or that of emptiness often experienced after strong tea has been drunk. At the risk of being denounced as an ascetic, and in the gay and fashionable world the denunciation is a formidable one, I can fearlessly assert, that the person who is troubled with sick headach, and has fears of lying awake at night, will acquire infinitely more pleasurable feelings and sleep sounder after a plain supper at tea-time of bread, or it may be of bread and butter, with water as the beverage, than after any other kind of repast, whether of tea or coffee, with meats, relishes, &c.

To say nothing of the uneasy sleep, nightmare, and the like, experienced by the supper eater, and of his greater tendency "to apoplexy, gout, obesity, scrofula, stone, dropsy, consumption, and similar complaints," his feelings are any thing but enviable in the morning. Obtuse compressed pulsation, pain in the head, hot dry tongue, tainted breath, teeth loaded with sordes, general lassitude, and giddiness amount-

ing sometimes to syncope, are in a greater or less degree his first sensations. The person, on the other hand, who wisely retires to bed without supper, or is at least contented with the repast just mentioned, or if his digestion be not specially impaired, a little bread and milk, or a little plain baked fruit and a glass of water, soon sinks into a calm and undisturbed sleep, awakes next morning refreshed and vigorous, his spirits animated, his head clear, and with a mind and body prompt and active to execute the evening's resolutions, and to undertake the labours of the day.

“Nothing is more common than to hear persons complain that they have no appetite for *breakfast*. After making the usual condolence upon the weak state of their stomach, it will generally be found, on further inquiry, that they have eaten a *little*, here synonymous with *hearty* supper, drunk a *small* glass or two of wine or spirits after it, gone to bed and slept, or tried to sleep, till the family bell rings them down to breakfast. This requires no comment. To those who rise early, and eat little or no supper, the breakfast is generally a pleasant and ought to be a hearty meal.”

In comparing the directions given by a French writer with those given by an English one, to visiters to watering places and mineral springs, we cannot help, from the few simple hints by the former, in regard to eating and drinking, and the many specifications of what is to be avoided by the latter, drawing a conclusion that John Bull is a very crapulous kind of body. On the same grounds it is to be feared that brother Jonathan must come in for a share of this compliment; for to a certainty he has some of

the oddest notions of regimen for a sick man that could ever be supposed to enter into the mind of a thinking being.

To the kinds of exercise and general range of amusements I have already adverted. I may add, on the subject of dancing, that if the company at a watering place breaks up at a seasonable hour, and if those who figure away on the floor should use a warm bath before retiring to bed, or at the farthest early next morning, that few objections (I speak now as a physician), can be made to this pleasing exercise. I do not wish it, however, to be inferred that I recommend dancing as a substitute for other kinds of exercise; but merely as a means of agreeably diverting the attention from little uneasy feelings and of passing off the evening—a period which, without one has the enjoyment of pleasing converse, is apt to give our spirits a sombre hue. If, however, the fine and nervous lady, or feminine dandy cannot venture to expose their faces to the elements during the *day*, it would be very unjust even to themselves, if they were to be allowed to spend four or six hours of the *night* whirling and jumping, which, fashionably rendered, means *waltzing* and *galloping*.

CHAPTER II.

Division of mineral waters into four classes.—Principal thermal springs of the United States and Europe.—The chief mineral springs of the four classes mentioned.

As relates to the systematic division of mineral waters, each writer has his own. Fourcroy divided them into nine classes—Duchanoy into ten—Monnet into three. The simplest arrangement, and at the same time sufficiently indicative of their properties, is that of Bergmann, slightly modified by Patissier, and Murray. It consists in classing them under four heads: viz.

- A. Hydrosulphurous, or sulphurous.
- B. Acidulous, or carbonated.
- C. Acidulated ferruginous, or chalybeate.
- D. Saline*.

There is a general division of mineral waters into cold and thermal, which shall be first attended to: then their classification in the order just laid down. After this I shall present to the reader a view of the chemical composition and medical virtues of each class,

* This differs but little from the division of mineral waters, by Murray of Edinburgh, into 1. Carbonated; 2. Sulphurous; 3. Saline, and 4. Chalybeate.

and a somewhat minute specification in these respects of the chief mineral waters of the United States.

PRINCIPAL THERMAL SPRINGS OF THE UNITED STATES.

In Virginia.

	Fixed Temp.
THE WARM SPRINGS - -	96°*
THE HOT SPRINGS, <i>warm bath</i> -	96
<i>hot bath</i> -	108
<i>spout bath</i> -	103

In North Carolina.

WARM SPRINGS (<i>Buncome County</i>)	94 to 104
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In Arkansa Territory.

HOT SPRINGS - - -	167 to 210
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PRINCIPAL THERMAL SPRINGS OF EUROPE.

In England.

Bath, <i>Cross Bath, fresh drawn</i> , 112,	92 to 94
<i>King's Bath</i> , 116,	100 to 106
Bristol Hot Wells - - -	74
Buxton - - -	82

In France.

Aix (<i>near Marseilles</i>) - -	95
Arles - - -	104 to 145
Ax (<i>near Thoulouse</i>) several springs	90 to 169
Bagnères de Luchon (<i>near the Pyrenees</i>)	86 to 145

* The temperature is expressed by the degrees of Fahrenheit's scale.

Bagnères Adour (<i>near Baréges</i>) sulphurous and chalybeate	- - -	86 to 102
<hr/>		
	saline springs	97 to 138
Balaruc (<i>near Montpellier</i>)	-	115
Baréges (<i>near the Pyrenees</i>)	-	88 to 113
Bonnes, or Aigues, (<i>near the Pyrenees</i>)	-	86 to 91
Bourbon l'Archambault, several springs	-	100 to 140
Bourbon Lancy, several springs	-	109 to 135
Bourbonne les Bains	- -	104 to 136
Cambo (<i>near the Pyrenees</i>)	-	73 to 95
Cauterets (<i>near the Pyrenees</i>)	-	86 to 112
Chatel Guyon	- - -	86
Chaudes Aigues	- - -	190
Dax (<i>near Bayonne and Bourdeaux</i>)	-	88 to 142
Evaux	- - -	104 to 132
Foncaude (<i>near Montpellier</i>)	-	77
Grévoulx (<i>fourteen leagues from Mar-</i> <i>seilles</i>)	- - - -	86 to 97
La Maloux (<i>fifteen leagues from Mont-</i> <i>pelier</i>)	- - - -	97
La Motte	- - -	183
Mont d'Or, several springs	-	108 to 113
Neris, several springs	- -	104 to 126
Olette (<i>near Perpignan</i>)	- -	190
Plombières, several springs	-	90 to 144
Rennes, several springs	- -	104 to 124
St Amand (<i>near Valenciennes</i>)	-	64 to 80
St Sauveur (<i>near the Pyrenees</i>)	-	95
Vichi (<i>on the River Allier</i>)	-	72 to 114

In Germany.

Aix la Chapelle, or Aken, several springs	110 to 143
Baden (<i>in Swabia, near Strasburgh</i>)	113 to 149
Buda Springs (<i>Hungary</i>)	100 to 135

Carlsbad, or Caroline Waters (<i>Bohemia</i>)	114 to 165
Groswarden (<i>Hungary</i>)	
Tœplitz, - - - - -	117
Wisbaden (<i>near Mayence and Frankfort</i>)	154

In Switzerland.

Baden (<i>near Zurich</i>)	approaching	212
Leuk, or Leoche, several springs	-	111 to 124

In Italy.

Aix (<i>in Savoy</i>)	- - -	113
Acqui (<i>ten leagues from Genoa</i>)	-	100 to 167
Ischia, island of, <i>Gurgitella Spring</i>		157
	<i>Olmitello and Citara</i>	
	<i>Springs</i>	- 100
	<i>Cappone</i>	- 100
Lucca, three springs	-	84, 111, and 129
Montecatini (<i>in Tuscany</i>)	-	72 to 90
Pisciarelli (<i>near Naples</i>)	- -	98
Pozzuoli (<i>near Naples</i>), several springs		86 to 101
Padua, several springs	- -	159 to 187
St Casciano (<i>Tuscany</i>)	- -	106 to 113
St Gervais (<i>in Savoy near Genoa</i>)		106 to 110
St Germain (<i>dry vapour bath near Naples</i>)	- - - -	122
St Julian (<i>near Pisa</i>)	- -	84 to 106
Tritoli, or Nero's Baths (<i>moist vapour, near Naples</i>)	- - -	170

In Portugal.

Caldas da Rainha (<i>twelve leagues from Lisbon</i>)	- - - -	92
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Of the thermal springs of Spain,* Sicily, and Greece, I am not at this time prepared to speak. The classical reader need not be told, that the far famed Thermopylæ derived its name from the hot springs in its vicinity.

The classification of mineral waters under the four heads of hydrosulphurous, acidulous or carbonated, acidulated ferruginous, and saline, requires that I should next present to my readers the names of the most celebrated medicinal springs under these several heads. Each admits of a subdivision into thermal and cold.

A.

1. *Thermal hydrosulphurous waters, or simply warm and hot sulphurous springs.*

Aix (<i>Savoy</i>),	Cambo,
Ax,	Calda da Rainha,
Aix la Chapelle,	Cauterets,
Acqui (<i>near Genoa</i>),	Fuente de la Sama (<i>in</i>
Baden (<i>Swabia</i>),	<i>Granada</i>),
Baden (<i>Switzerland</i>),	Grévoulx,

* Spain, as might naturally be anticipated from the geological features of the country, abounds in thermal springs, some of which were in high repute during the period of Roman occupancy, and subsequently under Moorish dominion; but they are now most of them neglected, or resorted to on the strength of their traditional fame, without any knowledge of their chemical nature, or correct specification of their medicinal powers. Of the more than one hundred warm and hot springs mentioned by Laborde, in his account of Spain, the temperature of one only is given, that of Gitana, 104 degrees of Fahrenheit, four leagues from Alicant. The springs of Sacedon, not far from Madrid, have obtained more celebrity from their being resorted to by the monarch and his court, than from their possessing any very decided curative powers. Sacedon is within a quarter of a league from the hot springs of Fuente del Rosal.

Bagnères Adour,	Padua,
Bagnères de Luchon,	Pozzuoli,
Baréges,	St Amand,
Bonnes, or Aigues Bonnes,	St Sauveur,
Ischia,	WARM SPRINGS (<i>Virgi-</i>
Leuke,	<i>nia</i>),
Olette,	Wisbaden.

2. *Cold hydrosulphurous waters.*

BIG BONE (<i>Kentucky</i>),	RED SULPHUR (<i>Virgi-</i>
Harrowgate,	<i>nia</i>),
Moffat,	SALT SULPHUR (<i>Virgi-</i>
Montmorency,	<i>nia</i>),
OLYMPIAN (<i>Kentucky</i>),	WHITE SULPHUR (<i>Vir-</i>
	<i>ginia</i>).

B.

1. *Thermal acidulous, or carbonated waters.*

Foncaude,	Mont d'Or,
La Maloux,	St Julian,
Monte-Catini,	Vichi.

2. *Cold acidulous, or carbonated waters.*

BATH (<i>Berkley County,</i>	Seltz (<i>nine leagues from</i>
<i>Virginia</i>),	<i>Strasburgh</i>),
Gabian,	SWEET SPRINGS (<i>Virgi-</i>
Santa Lucia (<i>in Naples</i>),	<i>nia</i>).

C.

1. *Thermal ferruginous, or chalybeate waters.*

Bourbon l'Archambault,	Rennes.
Carlsbad,	

2. Cold acidulated, or carbonated, chalybeate waters.

BALLSTOWN (<i>N. York</i>),	Plombieres,
BEDFORD (<i>Pennsylvania</i>),	Pymont,
Bagneres Adour,	Rouen,
Boulogne,	Rheims,
Forges,	SCHOOLEY'S MOUNTAIN
Hartfell,	(<i>N. Jersey</i>),
HOPKINTON (<i>Mass.</i>),	St Amand,
Nancy,	Scarborough,
Passy,	Spa,
PITTSBURGH (<i>Pennsylvania</i>),	Tongres,
	Tunbridge.

D.

1. Thermal saline waters.

Aix (<i>in France</i>),	HOT SPRINGS (<i>Virginia</i>),
Balaruc,	Lucca,
Bagnères Adour,	Neris,
Bath,	Plombieres,
Buxton,	St Gervais,
Bourbon les Bains,	WARM SPRINGS (<i>North</i>
Chaudes Aigues,	<i>Carolina</i>).
Dax,	

2. Cold saline waters.

Cheltenham,	SARATOGA (<i>N. York</i>),
Epsom,	Seidlitz,
Gamarde,	Seydchut (Bohemia),
HARRODSBURG (<i>Kentucky</i>)	Sea,
LEBANON (<i>N. York</i>),	Vaccia Madrid (<i>near Ma-</i>
Merlange,	<i>drid</i>).

CHAPTER III.

Sulphurous or Sulphuretted Waters.—Their value in relieving congestion of the veins—in chronic inflammation either of the viscera, or on the surface of the body—they purge without weakening—are deemed superior to mercury in hepatic affections—their efficacy in chronic rheumatism and gout—propriety of continuing their use for a length of time, except when they produce some febrile irritation.—Sulphurous waters superior to all other remedies in diseases of the skin—their use in correcting the effects of intemperance—in dyspepsia—hypochondriasis—habitual costiveness—jaundice—hemorrhoids—worms.—Caution against their stimulating effects, especially in those predisposed to hemorrhages or actually suffering under them.—They are to be occasionally diluted with milk or other fluids.—The hot sulphurous waters of Bareges and Aix la Chapelle greatly celebrated.—Imitations of these waters.—The White Sulphur Springs of Virginia—their general composition—efficacy in hepatic affections and chronic disorders, following bilious fevers—they are to be alternated with warm or hot bathing, especially in cutaneous diseases and chronic rheumatism—quantity drunk.—Red and Salt Sulphur

Springs of Virginia.—Efficacy of the Salt Sulphur in chronic affections of the abdominal viscera.—Great power of the Red Sulphur in pulmonary diseases simulating, or ending in, consumption, especially in the early stages.—Numerous sulphurous waters in the western states—in Tennessee.—In Kentucky among others are the Big Bone and the Olympian Springs, which display the beneficial properties of the waters of this class.

THE class of sulphurous waters consists of both thermal and cold springs. Their peculiar and offensive odour depends on a gas, the sulphuretted hydrogen, which, eminently destructive to life when inhaled into the lungs, may be rendered a salutary agent by being taken into the stomach or applied to the skin with water and certain saline additions.

We are all more or less conversant with what may be called the diffusible and penetrating nature of sulphur, either when volatilized by heat, or in its passage through the animal economy. Still more active and penetrating does it become when combined with hydrogen. There are few medicinal agents endowed with greater efficacy in a wide range of chronic diseases than sulphurous waters. They may be considered as the best representatives of the class of alterative remedies.

Dr Armstrong thinks these waters peculiarly valuable in relieving a preternatural congestion of the veins, and thus enabling the heart to regain its power. In delicate cases of this character, and also in many corpulent subjects, the common modes of depletion are always injurious; yet according to the author just

cited, "a regular course of Harrowgate sulphurous water, so as to keep the bowels gently open and to stimulate all the secretory organs, will be the best remedy; though during its exhibition the patient should occasionally use the tepid bath, and be placed in a fresh atmosphere, which is often highly beneficial. In many instances" he continues, "of chronic congestion I have seen the most agreeable change induced by a removal from the town into the country; and when we consider the invigorating power of pure air, we cannot be surprized if it should remove venous congestion by communicating a permanent tone to the heart and arteries." However hypothetical the explanation, it is consoling to be assured of the fact of such relief being obtained from disease; and the invalid has an additional reason in it for wishing to visit a mineral spring of the character just designated, since while using its water he is also inhaling a pure and invigorating air.

The following remarks of Dr Armstrong may, he tells us, be considered as the result of pretty extensive observation.

"The first thing which struck me in regard to the operation of the Harrowgate sulphurous water was, that the bowels might be opened by it day after day, week after week, without debility being produced; nay, on the contrary, most of the patients gained both strength and flesh, notwithstanding they had daily and copious evacuations. This circumstance alone seemed to give the sulphurous water a most decided advantage over the purgatives in common use; for it must be admitted, that they cannot be long continued in chronic diseases, without diminishing the strength. For some time, therefore, I solely attributed the

efficacy of the sulphurous water to its purgative property, together with the peculiarity that its long continued exhibition caused no debility; and as for a considerable period the complaints in which I prescribed were chiefly stomachic and hepatic, I was the more confirmed in this opinion as to its operation. But cases of chronic disease fell under my observation at various times, in which the sulphurous water was most decidedly beneficial, and that too where the bowels had been but scantily moved; and as the effect in these cases could by no means be purely attributed to its action on the intestines, I was led to inquire whether it might not have some other agency which had escaped my observation. In attending more closely to the changes which this water induced, I found that it acted most powerfully on all the secretory organs of the body, but more especially on the liver, on the kidneys, on the villous coat of the intestines, and on the skin. Here a new operation was presented to my inquiry. In reflecting on all the facts which had come before me, I ascertained that this water had removed chronic affections of various internal and external parts; and hence at length the inference followed, that it was really beneficial as a very powerful alterative, and that it had a direct influence over chronic inflammation, wherever it be seated, whether in the viscera, or upon the surface of the body. In still further pursuing the consideration of the subject, I was fully satisfied, that I had arrived at a general principle in the operation of the sulphurous water; for some time afterwards, on trial of that at Dinsdale, near Darlington, I found that its effects were also very powerful in chronic inflammations, though it be but slightly laxative. It at once, there-

fore, occurred to me, that the chief efficacy of the sulphurous waters of Harrowgate and of Dinsdale depended upon the sulphuretted hydrogen gas which they both contained; and indeed the principal difference between these two waters is, that the first contains less of the sulphuretted hydrogen gas, but more of the saline materials than the last; so that by adding very small doses of purgative salts to the one, it may be made to operate like the other in many cases."

In affections of the liver, highly as he estimates the powers of mercury, Dr Armstrong thinks that they are inferior to those of sulphuretted hydrogen gas, as combined with water in certain mineral springs.

"Chronic rheumatism and gout, and almost all cutaneous affections, will yield more rapidly to the continued internal exhibition of the sulphuretted hydrogen gas, than to any of the means now commonly employed; but in these, and also in most chronic complaints of the viscera, the recovery will be considerably expedited by the frequent use of tepid baths which contain the sulphuretted hydrogen gas. In many parts of this volume I have strongly insisted on the importance of attending to the functions of the skin both in health and disease; and I am fully persuaded, that much of the efficacy of the sulphuretted hydrogen gas is to be attributed to its action on the skin, through the innumerable pores of which it operates with remarkable power. At the same time it is to be recollected, that it is not upon one, but upon all the secretory organs, that it exerts a special influence; but certainly to the skin, as it is so capacious, a large portion of that influence is directed and next in degree it is generally spent upon the kidneys, both of which circumstances make it so be-

neficial in cutaneous diseases, and in those of the urinary organs."

In pectoral affections, complicated as they so often are in our climate with hepatic disorder, the sulphurous waters will be found to afford marked and permanent relief.

In scrofula, the internal and external use of these waters is far more efficacious than the measures commonly adopted for relief.

The importance of the subject, both as regards the number and variety of diseases, and the comparative facility with which, in various parts of the country, we can have recourse to the remedy for them in the shape of sulphurous waters, will justify me for introducing the following rather long extract from the essay of Dr Armstrong, already cited*. The necessity of perseverance in the drinking of the waters, the propriety of occasionally using laxatives at the same time, and of associating the use of the "tepid" (warm) bath of sulphurous water with its internal use, are all points worthy of particular notice.

"It has already been mentioned, that the sulphurous waters will sometimes fail in chronic diseases of disordered action simply : and this probably happens in cases where the blood-vessels have been so long distended, as to have lost in some degree the power of returning to their ordinary state; but nevertheless, in the main run, these waters will answer an admirable purpose in chronic diseases, when deranged structure is not present. At the same time it ought always to be recollected, that they may easily be brought into disrepute from short or imperfect trials of them; and

* Chronic Diseases and Sulphurous Waters.

therefore they should, for the most part, be continued daily, in sufficient quantity, until the disease completely gives way; or until their inefficiency has been fairly proved by an unremitted perseverance. In some chronic cases of ophthalmia, of rheumatism, and of cutaneous affections, I have known them to effect a cure in two or three weeks: while in other cases, apparently similar in all respects, twice, thrice, or even four times that period has elapsed before the cure has been accomplished; and what is here affirmed of these external affections is still more strongly applicable to internal diseases, which are seldom speedily overcome by these waters, how completely soever they may yield at last. In illustration of this point as to internal diseases, it may be mentioned, that I have seen both chronic inflammations of the liver and chronic inflammations of the rectum, where no benefit was produced for three or four weeks; and yet a continuance of the waters for six or eight weeks longer, has effaced every vestige of the morbid indications for which they were prescribed. The long use of ordinary medicines almost always tends to injure the general powers of the system; but this is not the case with those waters which contain the sulphuretted hydrogen gas largely, for they have an invigorating influence, though taken almost daily for weeks together. Yet whenever the sulphurous waters are prescribed, their operation should be narrowly watched; and they should always be omitted for a time when they produce headach, a white tongue, or some degree of febrile irritation. Some of these effects may follow their first exhibition, and especially when prescribed for subjects of a phlogistic diathesis; and similar symptoms also are apt to arise occasionally

from their long continued use. Before they be re-administered in such cases, the employment of purgatives is commonly necessary, the operation of which generally removes the febrile irritation, so that they afterwards mostly act without occasioning any similar inconvenience. But in all affections combined with vascular fullness the bowels should be daily moved during their exhibition; otherwise they may be liable to heat and irritate in a way almost similar to mercury. Nor need we fear, with the exception of complaints of the chest, to purge patients freely every day with the Harrowgate water; for under this system of depletion, they generally gain flesh and strength, particularly in gastric, hepatic, and intestinal affections. The tepid bath of sulphurous water, along with its internal use, is mostly very serviceable; but the temperature of the bath should be duly regulated, otherwise it may cause considerable exhaustion. The tepid bath of sulphurous water is most indicated in complaints of the skin, chest, and belly; but it ought always to be had recourse to with caution, when the head is affected, as it may increase the flow of blood towards the brain.

“Some elaborate and excellent works have been written on cutaneous diseases, but most practitioners will be ready to confess, that the modes of treatment recommended are often ineffectual: the internal and external use, however, of the Harrowgate, or of the Dinsdale sulphurous spring, will rarely fail to cure such affections; and indeed I dare assert in general terms, without the dread of refutation, that these seemingly simple compositions of nature are of far more efficacy in diseases of the skin, than all the various and complicated formulæ of art. But in the

treatment of all the scaly affections of the skin, it will be found a most important point to remove the scales by friction or some similar means, that the waters may be applied to the skin itself. Indeed I am convinced that many practitioners fail in complaints of the skin, merely from applying their remedies upon the surface of the scales: whereas if they were to remove the scales daily, the use of the sulphur ointment, or of a tepid bath of sulphurous water, would frequently succeed; provided the digestive organs be properly regulated, for they are often concerned in the production and continuance of cutaneous diseases."

These views of Dr Armstrong respecting the efficacy of the Harrowgate sulphurous waters are fully confirmed by Dr Hunter in the following terms:

"The *sulphur water* speedily and easily carries off the effects of intemperance in those who, having spent the winter and spring in festivity, resort to Harrowgate with their system loaded with impurities, and excited by repeated debauches. Its use is acknowledged in those predisposed to apoplexy. In chlorosis or green sickness, it has been usual to drink the sulphur water for some time, and then take the chalybeate. In diseases of the skin, especially the order squamæ of Willan, who mentions his having seen some very obstinate cases of lepra, alphas, and psoriasis, completely cured by this water; in porrigo, herpes, and the impetigines; scrofula, scurvy, secondary syphilis, and ulcers, its use has been equally efficacious. In gout also, in both its principal divisions of regular and irregular, or atonic; in the first, the constitution is sound and vigorous, the fits are severe and regular, and there is generally plethora and inflammatory diathesis: in the second, the constitution is debilitated

and diseased; the fits irregular; the alimentary canal, head, breast, and urinary passages, affected with various complaints, alternating with the fits. In the former, the water may be taken as an habitual laxative; in the latter, its use requires considerable caution; the warm or vapour bath will frequently prove useful. In the numerous list of complaints now comprehended under the term dyspepsia, or indigestion; in many of which, however, the saline chalybeate water is preferable. In flatulent and bilious colic; habitual costiveness; in hypochondriac affections; jaundice; hemorrhoids or piles; worms; in chronic rheumatism, with the warm bath; and lastly, in some cases of dropsy, by active purging. In stone and gravel, the weaker sulphur water at Starbeck has been much extolled."

It seems proper, however, to somewhat modify the eulogies of Dr Armstrong, sanctioned by Dr Hunter, so as to prevent our putting implicit faith in the opinion of the former of these writers, that sulphuretted hydrogen, taken internally, has a somewhat sedative effect. This belief is at variance with Dr A.'s explanations of the *modus operandi* of the gas and the water containing it, in which he supposes it to excite all the secretory organs and surfaces. In cases of decided phlegmasia and fixed irritation in a part, with pain, we should feel diffidence in advising the sulphurous waters to be drunk. The French physicians admit that, in certain cases of pulmonary disease, even simulating ulcerated and tubercular lungs, these waters have worked great cures; yet they caution us against persisting in their use, if the hectic be well established and proceed with a rapid march. In those predisposed to hemoptysis, or who have recently had

an attack of it, the sulphurous waters ought to be very weak, or to be taken in small doses mixed with milk. The warm and hot waters of this class are to be regarded as still more stimulating than the cold, and less admissible in plethoric habits, and those suffering from undue determination to any part.

In France the highest reputation has been awarded to hot sulphurous springs, as those of Baréges, applied externally as a douche to old fistulous sores and ulcers in consequence of wounds.

Most of the good effects already detailed have been obtained by the judicious use of artificial sulphurous waters. The following is the formula of M. Swe-diaur for imitating the waters of Baréges, Aix la Chapelle, &c.

Pure Water,	-	-	40 pounds.
Carbonate of lime,	-	-	5 drachms.
Carbonate of soda,	-	-	10 drachms.
Muriate of soda,	-	-	7 drachms.
Carbonic acid gas, and sulphuretted hydrogen gas,			of each 900 to 1000 cubic inches.

Hydro-sulphurous water made by MM. Tryaire and Jurine.

Pure water,	26 ounces.
Sulphuretted hydrogen,	$\frac{1}{8}$ of the volume of water.

The stronger water is made by adding a third of the sulphuretted hydrogen. When used as baths and lotions the proportion of the gas is increased.

In the treatment of the itch, Doctor Jadelot employs a sulphurous bath very analogous to that of artificial water of Baréges, but of a more simple composition. It consists of sulphuret of potass (liver of sulphur), either dry or liquid. If the former be used, it

is in the proportion of five ounces to 150 pounds of water. The liquid sulphuret at 35° of the aerometer for salts is added, in the proportion of eight ounces to nine or ten buckets full of water.*

Persons affected with the itch, whether recent or old, are generally cured after having taken from five to ten of those baths.

Among the celebrated waters of this class are those of Aix la Chapelle. The city of Aix la Chapelle or Aken, which by the congress of Vienna was included in the Prussian dominions, is twelve leagues west from Cologne, nine north east from Liege, seven from Spa, and eighty from Paris. It is situated in a fertile valley surrounded by mountains and covered with woods; and enjoys the greater part of the time a salubrious air. Its thermal waters appear to have been known to the Romans, but owe their modern fame and the improvements connected with them, to Charlemagne, who made Aix la Chapelle his residence, and occasionally held his levee in the bath with all his attendants. The favourable situation of the city enables it to be furnished in abundance with all the necessaries and even the luxuries of life. The waters may be drunk at all seasons, and M. Reumont, the superintending physician, says that he has seen cures of serious disorders from the use of the waters of Aix in the midst of winter.

The principal springs, three in number, issue from between beds of calcareous and micaceous freestone; and unite in large reservoirs covered by an edifice which is surmounted by a dome; whence they are distributed to the bathing houses, to the number of four.

* Patissier, op. cit. p. 121, 122.

The emperor's bath is generally said to be of the temperature of 136° F.; though Bergmann makes it 143½° F. In the different baths the water is found at various degrees of heat from this point to 110° F. At the fountain where it is drunk it is about 112°.

The analysis of MM. Reumont and Manheim makes it contain carbonates of soda, lime, and magnesia, muriate and sulphate of soda, and silex; the gases are in the following proportions:

Azotic gas,	52.25 cubic inches.
Carbonic acid,	28.26
Sulphuretted hydrogen,	20.49
	<hr/>
	100.00

The medical virtues of these waters have been long famed, and their administration presents the same advantage as those of the waters of Baréges and Bagnères de Luchon. They are adapted to all chronic cutaneous disorders, itch, herpes, tinea, blotches, pemphigus, leprous eruptions, scrofula, asthmatic affections, chronic rheumatism, dyspepsia, jaundice dependent on engorgement of the liver, colica pictonum, fluor albus, melancholia, hysteria, exostosis, caries, incomplete anchylosis, stiffness, weakness, and contraction of the limbs from gun-shot wounds.

Hufeland recommends these waters in hypochondriasis. They must be used with much caution in paralysis which results from apoplexy. There are many circumstances which would forbid their use, and in which they might be productive of serious consequences; as excessive debility, a febrile state in general, disposition to hemorrhage, phthisis in the ulcerative stage, congestions in the head and breast;

they are also hurtful in scirrhus tumours, cutaneous ulcerations, &c.

Their use is external and internal. The water of the great spring is drunk in doses of from two glasses to a pint. Two or three pints prove purgative.

Weak and emaciated persons may put in the first glass of the water some ass's milk, or a spoonful or two of cow's milk. If nausea and vertigo follow the use of the water for the first few days, it may be drunk cold, and then the invalid can gradually accustom himself to its common temperature. It may be combined with that of the Spa waters, which are chalybeate.

There are warm and vapour baths and douches very well arranged at Aix. The period of the duration of the bath is from half an hour to an hour, according to the temperament and nature of the disease.

Artificial Mineral Water of Aix la Chapelle.

By MM. Tryaire and Jurin.

Water,	20 ounces
Sulphuretted hydrogen,	$\frac{1}{3}$ of the volume.
Carbonate of soda,	20 grains.
Muriate of soda,	9 grains.

Having now placed before the reader an account of the more prominent virtues of sulphurous waters, as ascertained by the use of the most celebrated ones of England and France, he is prepared to make the application of this knowledge to guide him in his estimation and use of the sulphurous waters of the United States. It cannot be said that it is reasoning too much in a spirit of generalization, to attribute virtues to our own mineral springs nearly similar to those of the old world, when we know that the active

principle, that from which their virtues mainly arise, is the same in both. Indeed the experience of the wonderful effects of such waters as the White Sulphur Springs of Virginia would nearly of itself suffice, even were we not aided by an approximative analysis, to show the general resemblance between them and Harrowgate. This basis established, fewer details will suffice respecting our own springs. Of these I now proceed to speak.

The *White Sulphur Springs*. Though little significant by their title, which is derived from the colour of the precipitate in the bottom and sides of the well from which the water is drunk, these springs are famed throughout Virginia and the adjoining states to the south, for the number of cures of very obstinate diseases, intractable to the physician, and driving almost to despair the patient.

These springs are in the county of Greenbriar, in a hilly and mountainous region of country, thirty-seven miles in a southwesterly direction from the Hot Springs. There are two gums, as they are called, or small wooden reservoirs into which the water rises, and whence it flows, after a short distance into Howard's creek, a branch of the Kenhawa river. The water is very cold, and by its taste indicates an abundance of saline substances in its composition. It deposits largely a whitish matter consisting of sulphur and some earth.

Rouelle makes a quart of the water to contain the following substances, which I give in more modernised terms, without, however, professing to be much of a chemical purist.

Sulphuretted hydrogen,	
Carbonic acid,	
Carbonate of lime,	12 grains.
Sulphate of magnesia,	5 “
Sulphuret of lime,	2 “
Muriate of lime,	1½ “
Iron,	1 “
Sulphur precipitated,	¼ “

There is not much uncombined sulphuretted hydrogen gas, or hepatic air, as Rouelle calls it. Its holding iron in solution also modifies its operation, and renders it more stimulating than the simple saline sulphurous water.

The White Sulphur Springs have been much resorted to by invalids suffering from dyspepsia, chronic hepatitis, the slow fever following remittent, bilious, or ill-cured intermittent fevers; chronic rheumatism, cutaneous diseases, uterine derangements, such as obstructed menstruation and fluor albus. In dyspepsia unconnected with chronic inflammation and fixed pain of the stomach, these waters will have an excellent effect; and especially if, as is so often the case in the middle and southern states, this disorder be connected with obstructions of the liver and enlarged spleen. Persons who have brought on dyspepsia by excesses in eating too much mixed food and drinking distilled and fermented liquors, if they restrict themselves to simple food in moderate quantities, and use no other fluid than the mineral and common water, have every thing to hope for by a residence of a few weeks at the White Sulphur Springs. The jaundiced skin will here often receive its natural hue, the temper its wonted evenness, and most of the other unpleasant

bilious symptoms, as they are called, will disappear by a suitable hygienic course at this favoured spot. That state consisting in peculiar debility and nervousness, and cutaneous eruptions, from the excessive use of mercury, will be removed by the same means.

The great drawback to the benefits derivable from visiting the White Sulphur Springs, is the want of suitable conveniences for bathing. That prejudices should exist against the use of the water, for this purpose, of the common temperature of the springs, is not surprising, even had we not heard of cases in which its injurious if not fatal effects have occurred. But no such objection could apply were the water raised to a tepid or warm temperature, and conveniences afforded for using it as a bath. Even the substitute of sponging the entire surface of the body with the sulphurous water of a convenient heat, cannot well be done, on account of the limited room and want of privacy in the cabins; in which for the most part persons visiting the springs lodge. The necessity of adding the bath to the internal use of this mineral water, is the more obvious from the fact, that in all the diseases for the cure of which it has acquired reputation, it is of the utmost importance to restore and preserve the functions of the skin.

There is, however, one great resource in this difficulty; and it is one which is peculiar to this district of country. At a distance easily passed over in a day's ride, the invalid finds thermal waters—the Hot Springs, in the warm bath of which he can enjoy the luxury and benefit from bathing. The skin, in this last place, and the internal organs, in the former, are each, in turn, placed in circumstances the most favourable to

a restoration of their healthy state. In chronic rheumatism and in cutaneous diseases, this alternate subjection to a period of warm bathing and a course of drinking sulphurous water is imperatively required to insure permanency of cure.

As regards the quantity to be drunk of the White Sulphur water, much must depend on individual peculiarities and personal experience. The rules for general guidance in this respect have been laid down in the last chapter. Some recommend the invalid to drink four half-pint tumblers in the morning and one at night—supper to be abstained from. Much, however, will depend on the immediate effects which are desired to be obtained. If purging be the object, larger doses are taken than when a diuretic or a simple alterative effect is desired. It were, perhaps, to be wished that whatever quantity is deemed necessary during the day should be drunk in two parts, one before breakfast and one an hour before dinner, so that the stomach should not be unduly excited in the after part of the day, and the digestive process retarded by foreign matters, such as mineral waters confessedly are. If peculiar circumstances should seem to render it proper to drink the water in the evening, the fluid ought to be made slightly warm, or if weight and coldness at the stomach have been complained of and wakefulness in the night, it ought to be rather hot.

In reference to the taste of the sulphur water, I would say, in the language of Dr Hunter:

“I shall not endeavour, as has been gravely attempted by some, to persuade any one that water loaded with sulphuretted and carburetted hydrogen gases is pleasant to the taste; unless their fancy, like

that of a worthy friend, range so high as to imagine while taking this water, or a solution of glauber salts, that they are enjoying a cup of well-sweetened tea. However nauseous or disgusting at first, it is generally allowed that it becomes much less disagreeable by use. A bite of plain bread or biscuit will take off the fetor, and reconcile the palate as effectually and more harmlessly than any spice or aromatic, which is frequently used for this purpose."

Under the head of sulphurous waters, as far as regards their name and impregnation, we may class the celebrated Salt Sulphur and Red Sulphur Springs of Virginia. From neither of these, however, have I learned that sulphuretted hydrogen is given out.

The *Salt Sulphur Spring* is in Monroe county, and the *Red Sulphur* in Giles county; in the same mountainous region in which we meet with the White Sulphur and the Sweet Springs, and the Warm and the Hot Springs. I cannot do better on the present occasion than avail of the information kindly furnished me in a letter by an esteemed friend, himself a physician and an invalid, and free from any undue sectional bias in favour of this or that particular spring.

"Of the Warm and Hot Springs I can say but little from my own observation; report is highly favourable to their use in a variety of cases. In chronic rheumatism and hepatic affections of long standing, I have seen them very useful, and when aided by a proper course of medical treatment, I have witnessed surprising recoveries. The White Sulphur is next on the list, and, so far as popular favour is a test of its merits, is decidedly the most important in this section of country. It is certainly a valuable

spring, and possesses very important qualities: it is actively cathartic and makes a very decided impression on the liver—this organ is the stumbling block of us ‘southrons;’ our swarthy complexions, ague faces and debilitated walk, all manifest derangements in our hepatic systems. Under these circumstances, a visit to the Sulphur Springs is almost a *sine quâ non* to the recovery of health.

“The two springs which have most attracted *my attention*, and of which I think most favourably, are the *Salt Sulphur* in Monroe county, and the *Red Sulphur* located in Giles county. I have already passed three summers in this country, and am now here for the fourth time; each season has confirmed the good opinion I had formed of these waters. I have never been provided with an apparatus for analysing the water at this place, but it appears to me to imitate most closely all the good effects usually resulting from the use of mercurials. It does not (the *Salt Sulphur* I mean) operate so speedily as the White Sulphur; but the system appears gradually to undergo a change, the results of which are truly beneficial. Patients with enlarged livers, distended abdomen, yellow skin and discoloured adnata are often restored to health in a few weeks at this place. Dyspeptics (if derangement of the liver is the cause) are almost universally relieved; the most delicate stomachs are, under their use, enabled to digest pastry, fruit, &c. &c.* Nephritis is another of the evils often relieved by the waters. You will think me an enthusiast, but I assure you that after an attentive observa-

* This remark is, of course, intended to show the improvement in the digestion, but not to intimate the propriety of an invalid’s eating pastry and such other similar noxious matters.

tion for several summers, I am more disposed than ever to think well of these waters. Some of the worst cases of disease I have ever witnessed—cases that had baffled the skill of our most intelligent physicians, have been effectually cured, and restored to usefulness in society.

“The *Red Sulphur* is peculiarly adapted to affections of the chest, or, to speak more definitely, to pulmonary consumption in all its stages.

“In the early stages of pulmonary disease, I esteem these waters as efficacious, I had almost said, as quinine in intermittents. Their effect on the pulse is very remarkable. I recollect distinctly a case in which the lancet had failed entirely to keep the pulse down, that was entirely under the control of these waters. I have (not once or twice, but often) seen the cough, hectic fever, diarrhœa, and night sweats entirely subside under the use of them. The pulse I have known reduced from 104 to 80 in twenty-four hours; while the strength was evidently improved, and the digestive organs enabled to perform their functions with increased vigour.

“With regard to the quantity of these waters to be drunk, you would infer that they possessed little power, or much mischief would arise; and yet the small quantity, comparatively speaking, which affords material relief to others, leads us to an opposite conclusion. The fact appears to be capable of explanation. When a large quantity is drunk, as twenty tumblers a day, it passes off immediately either by the bowels or kidneys, and affords only temporary relief. When it is drunk in moderate quantities, as six tumblers a day, on an empty stomach, it certainly acts as an alterative, and its good effects are permanent.

So far as my experience has gone, the rule holds with all the waters west of the Blue Ridge. The benefit from the waters is most apparent in those who drink largely, but the permanent advantage remains entirely with those who drink less and use it longer. One observation more.

“The water should not be used for more than twelve or fourteen days successively; let them be omitted for a week, and then resumed. Let me again call your attention particularly to the Salt Sulphur and Red Sulphur waters; they possess virtues little known, that ought to be brought to the notice of our profession.”*

The preceding observations are entitled to the more weight from the circumstance, already adverted to, of the writer's having been himself an invalid, and suffered at different times from hemoptysis. His intimate conviction, from personal experience, of the efficacy of the two springs has been strengthened by observations of the cases of others, to which his own infirmities would naturally be supposed to quicken his attention.

From another medical friend, residing in that section of country in which the springs are situated, I have received information of a similar tenor to that already laid before the reader. “From my own observations,” says this gentleman, “I am induced to

* The amiable writer of the above highly interesting communication, will, I am sure, pardon me for thus giving publicity to his experience, when he reflects on the real public good which knowledge of this kind is calculated to produce. In obedience to his injunction I must withhold his name: many a person would be pleased to have his blazoned abroad, though attached to a very inferior production to this familiar epistle.

believe the *White Sulphur* the best adapted to such diseases as we familiarly denominate bilious and liver complaints; the *Salt Sulphur* to dyspepsia and all affections of the stomach, whether connected with the state of the liver or not. The *Red Sulphur* is certainly a very peculiar water, and is said to be 'specially' adapted to pulmonary affections."

In selecting the Virginia Sulphur Springs as the most celebrated of their class in the United States, I do not wish to be understood to intimate that they are to be preferred by invalids to all others. On the contrary, there are, I doubt not, many mineral waters in different parts of the country, little inferior in strength and remedial value to them. Nature has been exceedingly bountiful to the western region in the abundance and excellence of its sulphur springs; especially of those in which sulphur and the muriates of soda and lime are held in solution. Throughout the longitudinal range of Tennessee for example, from west to east, from Nashville on to the Virginia line, the traveller must have been struck with the number of those springs which present themselves in regular succession on or near the high road. *White's Creek Spring*, twelve miles from Nashville, is much resorted to. My stay at it was too short to enable me to glean much respecting the virtues of its waters from personal observation. I learned that it contained sulphate of magnesia, iron and sulphur; the impregnation with this last was very strong, the taste even acid. Experience has shown that this water, when drunk, is best adapted to diseases of low action. In calculous affections and cutaneous disorders, it has the reputation of having wrought wonderful cures.

Robertson's Springs are saline: they are twenty miles from Nashville.

In East Tennessee especially, inducements, presented as well from this cause as from the purity of the air and agreeable variety of scenery, are held out to many families from Mississippi and that region of country, for change of climate and travel. Many avail themselves of the advantages thus offered, and realize more completely what they hoped for than if they had visited more celebrated watering places, and become the slaves to fashions and usages, often irksome by their strangeness, and injurious by their taxes on personal comfort and health.

Twenty miles east from Knoxville are Lee's Springs, two sulphur and a chalybeate: the last is very strong. At Rutledge, (Grainger County), and at Beane's Station, are strong sulphur springs.

In Kentucky, also, the mineral springs of the sulphurous class are numerous, and some of late years have been largely resorted to by company. Of these the most noted are the *Big Bone* Springs or *Salines* and the *Olympian* Springs.

The water of the former is represented by Dr Drake of Cincinnati, a gentleman well qualified to speak on the subject, as containing sulphuretted hydrogen in large quantities, and holding in solution also the muriates of soda and lime, and the sulphates of soda or of magnesia. The disorders to which he thinks it more peculiarly adapted are "the torpor, obstruction or chronic inflammation produced by acute diseases of the lungs, liver, spleen, kidneys, in short any of the viscera, and which have not continued so long that the constitution is exhausted. In these

cases experience has shown them to possess all the efficacy that could be expected in any mineral water. From a pint to a gallon may be taken daily according to the strength of the patient and its sensible effects on the system. The quantity drunk at first should be small, especially by those of a reduced habit."

"These waters do not," says Dr Drake, "increase the pulse, but their sensible effects on the alimentary system, kidneys, and skin, are great. The action of the former is very much increased, and the latter is frequently affected in a few days with a violent itching, and an eruption of pimples or pustules, which are now and then connected with large biles."

To the diseases mentioned by the author just quoted, may be added rheumatism and chronic cutaneous eruptions. The same complaint is to be made here as at the other sulphurous springs, viz. the want of baths. Some years ago, when I visited these springs, there was another inconvenience requiring remedy, the exposure of the invalid during bad weather, owing to the uncovered and badly laid-out walk between them and the house. The common quantity of water drunk at a time, or at least in short intervals, was three half pints. The springs are within two miles of the Ohio river.

The Olympian Springs of Kentucky are, I believe, of the Salt Sulphur kind*.

* I have been greatly disappointed at not being able to refer, as I had confidently anticipated, to the number of the *Western Medical and Physical Journal*, in which Dr Drake gives an account of the chemical properties and medical virtues of the Olympian, Harrodsburgh, and other springs of the west. I now, just at the moment of need, cannot find it either among our exchange numbers, or in the library of one or two friends where I felt assured it could readily be obtained.

CHAPTER IV.

Chief characteristic of the acidulous or carbonated waters is their having an excess of carbonic acid—their general medical virtues—they are easily imitated by chemical art.—Best example of this class in the United States is the Sweet Springs of Virginia—their chemical composition, temperature, and curative virtues.—Pleasurable and healthful effects of bathing in these waters.—The Bath water, Berkley county, Virginia, resembles the Sweet Springs.—Thermal acidulous waters of France—those of Mont d'Or and Vichi the most celebrated.—The most generally known cold acidulous waters are those of Seltz.—Artificial Seltz water.—Santa Lucia Spring in the city of Naples.

THE next class of mineral waters is the acidulous—cold and thermal. This title is not, it must be acknowledged, very significative of their exact nature and composition; and yet it seems to cover a list which could not be so conveniently arranged under other heads. The chief characteristic feature of these waters is the predominance of the carbonic acid (fixed air) which they contain. They have a lively and somewhat stimulating taste, which is lost in proportion as the gas disappears.

The acidulous waters give rise to a white precipi-

tate by the addition of lime water, and they redden the syrup of violets. They contain carbonic acid in various proportions, and several salts—the chief of which are, muriate of soda (common salt), carbonate of soda, carbonate of lime (chalk), magnesia, and sulphate, and carbonate of iron.

The medical use of this class of waters is most advantageously displayed in allaying the thirst and heat of feverish action which accompany a disturbed state of the stomach and inflammation of the liver and other viscera, and in subduing irritation of the kidneys, checking copious discharges—diarrhea and fluor albus, &c. They are useful in cases of chronic or sub-acute inflammation, in which the sulphurous and chalybeate water, or even the compound saline, would prove too exciting. By thus allaying morbid irritation, and gently restoring the functions of the stomach and intestines, they have credit for a tonic power, which is thought to be displayed in their occasionally restoring the suppressed menstrual discharge, and dispelling the feelings of languor and melancholy so often the concomitants of dyspepsia. They sometimes cause unpleasant drowsiness and flatulency, and in apoplectic habits are to be used with caution. To derive the fullest benefit from these waters, they ought to be drunk at the fountain head, as the carbonic acid is largely given out if the water is allowed to remain in a vessel after being drawn. Great care is requisite that this gas be not lost in putting up the water for transportation, and use at distant places.

Of all mineral waters, the acidulous are those which, by the aid of chemistry, we have been able most successfully to imitate. The leading object has been to impregnate water with carbonic acid to the extent of

several volumes of the latter to one of the former. It is this carbonated acidulous water which is sold at all the apothecaries' and most of the confectioners' shops under the name of soda water. This last is a wrong appellation, for although at first it was customary to add a small quantity of soda to the water, at present there is not in general I believe any addition of this kind made. The carbonic acid is readily obtained for the purpose, by pouring hydro-chloric (muriatic) acid, diluted with twice or thrice its weight of water, on pounded marble (carbonate of lime). The stronger acid unites with the lime, forming a muriate, and the carbonic acid is disengaged. Or it may be obtained from chalk or limestone; and sulphuric acid (oil of vitriol), with ten or twelve times its weight of water, substituted for the muriatic acid. The inconvenience of this last method is, that the sulphate of lime which is formed, having little solubility, is deposited on the carbonate, covers it, and prevents the disengagement of the acid.

Carbonic acid is readily united with water in equal volume under the common pressure of the atmosphere; but the soda water from the fountain, in the shops, contains many times its bulk of the acid. This result is obtained by an apparatus which allows of high pressure, and by which the acid is forced and retained in the water.

The Sweet Springs. The best example of the acidulous class of water is the Sweet Springs in Monroe county, Virginia. They are 29 miles from Fincastle, 46 from the Red Sulphur Springs, 22 from the Salt Sulphur, 20 from the White Sulphur, and 43 from Bath Court House. The Sweet Springs rise on the north side of a large mountain called by the same name. "The

south side is covered with stones of an ochrous appearance. In many places iron may be found, but on the north the mountain is fertile and covered with a rich mould, at least, near the spring." The chief spring and bath adjoining are at the lower end of a small hollow or valley, from which the ground gradually swells on either side. A fine covering of grass and the woody shade give means for a pleasing promenade in good weather. The water used for culinary purposes is brought down the hollow from the side of the mountain in wooden pipes. The house and cabins afforded, as I was informed, accommodations for about 300 persons. One could wish that in place of these wooden or log cabins, raised on logs and under which pigs often repose unheeded, small houses of brick, well plastered, were erected. Perhaps this improvement has been made.

The water of the spring rises into a large cylindrical reservoir, from opposite sides of which it flows out by small pipes ; one conveying water to the bath for the men, the other to that for the ladies. This arrangement ought to be imitated at all the other springs where there are public baths, as more consonant to those notions of delicacy which can never be too sedulously encouraged. Where there is but one bath in common to both sexes, different periods for bathing preserve, it is true, all the proprieties; but the division as above is preferable. The men's bath is of a quadrangular form, surrounded by a wall, and open at the top. It is of tolerable extent and clear—the bottom being of gravel, and the water constantly flowing in and as constantly passing out, after it reaches a certain height.

The temperature of the Sweet Spring is 73° F.,

the same as that which in England by a strange blunder is called Bristol Hot Well. There is a considerable resemblance between the two in other respects, as well in the abundant evolution of carbonic acid as in the earthy and saline matters held in solution. In the Virginia Spring, however, iron has been detected, whereas the Bristol Hot Well has none in its composition. If we can rely on the rather crude analysis of Rouelle, one quart of the water of the Sweet Spring contains,

Saline substances in general	12 to 15 grains,
Earthy substances	18 to 24 “
Iron	$\frac{1}{2}$ to 1 grain.

The saline substances are sulphate of magnesia, muriate of soda, and muriate of lime with a little sulphate of lime. The earthy matters consisted of sulphate of lime, a small portion, carbonates of magnesia and lime, with a small portion of silicious earth.

The deposition of calcareous matter from the waters as they flow down the meadow is so great as to form a kind of dam, of considerable height and thickness, at about a mile on the road to the White Sulphur Springs.

At this distance, in a hollow close to the road, are two other springs issuing out from the rock. They are said to possess different properties, one from the other; but neither in taste nor temperature is this difference perceptible; and their contiguity is such that they are only separated by a rock. The general name given to them, considered as one, is the *Red Spring*—derived from the colour of the deposit which incrusts the rock over which it flows, and which is like ochrous earth and evidently chalybeate.

According to Rouelle the Red Spring, or Spa water as he terms it, has, in the quart,

Carbonic acid,	
Carbonate of lime,	4 grains,
Carbonate of magnesia,	3 “
Carbonate of iron,	2 “
Silex,	1 grain,
Sulphate of magnesia,	1 “
Muriate of soda,	$\frac{1}{2}$ “
Iron combined,	1 “

In the meadow, near a mill, there is a sulphur spring: the sulphur is deposited in large flakes.

Few mineral waters have acquired such fashionable and well merited celebrity as the Sweet Springs. The name is calculated to convey erroneous impressions of their taste, which is like a solution of a small quantity of a calcareous or magnesian carbonate. The excess of carbonic acid gives, however, the waters a briskness, productive of a very different effect on the palate from what an imperfect mixture of the earths would produce.

The first effects of this water, due to its temperature and gaseous contents, when drunk, are a feeling of warmth at the stomach, with a sensation of fullness of the head and some giddiness. Taken at stated intervals in moderate quantity, it will produce a moisture on the skin and increase the flow of urine. If the stomach be in a good state, it gives additional appetite and imparts fresh vigour to the system. Its operation on the bowels varies at first; but after a more protracted use it will generally be found to induce a costive habit.

The Sweet Spring water is serviceable in the varieties of dyspepsia accompanied by gastrodynia or

spasm, with pains occurring at irregular intervals and heart burn—where the extremities are cold and the skin torpid. In secondary debility of the digestive canal, from the exhausting heats of summer, or in chronic diarrhœa and dysentery without fever, or not sustained by hepatic inflammation, much good will be produced by the internal use of these waters.

If much gastric irritation or evident phlogosis of the liver be present with a parched skin and other phenomena of fever; it will be better to premise one or two small bleedings followed by the use of a blue pill at night and a tumbler-full or two of the water to which has been added a tea-spoon full of epsom salts, or twice the quantity of calcined magnesia early in the morning.

The harassing cough to which young persons are occasionally subject, and which often has its origin in an enfeebled state of the stomach, or in scrofulous habits from enlargement of the bronchial glands—as also the *tussis humoralis* of old people, will all be materially benefited by the use of these waters. The relief afforded in such cases as these has usually given Bristol Hot Well its reputation in the cure of pulmonary consumption.

Females of what are termed a nervous habit of body, who have been enfeebled by protracted confinement, or long nursing their children, deprivation of exercise and of the enjoyment of fresh air, and who have, in addition to these causes of dyspepsia, made excessive use of tea and coffee, spices, and condiments, will find their strength and health restored by drinking these waters, as well as bathing in the manner to be soon mentioned. Irregularity in the uterine functions will often soon disappear after the

restoration of the digestive system to its former energy.

As we should have inferred from the excess of carbonic acid, and the presence of the earthy carbonates in the water; it is useful in calculous and nephritic complaints.

Pending a gouty attack, and the remarks to be made apply to the acute form of dyspepsia with febrile action, heat, and thirst, the Sweet Spring water is not advisable. It may be useful as a prophylactic or preventive, after the subsidence of the symptoms mentioned; and when there is much general languor, deficient appetite, and feebleness of the stomach, it can be drunk with decided advantage, evinced in restored vigour of the nutritive functions and equable state of the nervous system.

In acute rheumatism, the waters with the addition of neutral salts, and the use of the bath will be of service. But in chronic rheumatism, in which there have been for a longer time stiffness of the joints and cold skin, our chief reliance must be placed on the baths of the Warm and Hot Springs, followed by or alternated with the use of the Sulphur Spring water.

The usual times for drinking the waters at the Sweet Springs are early in the morning, between twelve and one o'clock, or some little time before dinner, and in the evening at tea time. This latter epoch is an improper one, except the invalid suffer at the time from spasm of the stomach, or experience a morbid and gnawing sensation of hunger.

The use of the bath at the Sweet Springs is adapted to a large number of cases, viz. in which there is a morbid or irregular heat of the surface, with some febrile action. The first sensation on immersion in the

water is a slight shock, after which the feeling of coolness is refreshing and rather agreeable. We can have less hesitation in bathing in water of a tepid temperature, as this almost is, than in a cold bath. For common hygienic purposes it is quite safe and reviving; and in disease, may be used with considerable freedom, but not to the neglect of those precautions given when I spoke of the cold bath. A more efficacious mode of applying this water to the skin, would be by douche—the stream being directed on the region in which the irritation was fixed, and wherever there was augmented heat and fixed pain, as over the stomach, or liver or abdomen generally, above the pubis, or on the loins and sacrum—also to the joints, when the violence of inflammation has not yet subsided nor passed entirely into the chronic state. If the irritation of the stomach forbids the drinking of the water, douching of the epigastrium would form a good preparative for its use in this way. Lumbago with some evening fever, chlorosis, or fluor albus, with heat and pain at the loins, would all be benefited by douching this part.

The freedom and advantage with which the bath at the Sweet Springs has been used by aged persons is evidence of its general safety. The chief points to be attended to are, that the skin shall not be moist or cold with perspiration, nor that there shall be general chill, nor the languor which follows excessive muscular action; the stomach also should be nearly empty, or, at least, not actively engaged in its work of digestion. The duration of a bath is usually too long; from five to fifteen minutes, will embrace periods adapted to all conditions. Even the more robust ought not to stay in longer than the last mentioned time.

The waters at *Bath*, Berkley county, Virginia, resemble in temperature and sensible properties the Sweet Springs.

The two most celebrated thermal acidulous springs in France are those of *Mont D'Or* and of *Vichi*. The former were known to the Romans, who erected several buildings on the spot, the remains of which are still visible.

There are four principal springs at *Mont D'Or*, the temperatures of three of which are decidedly thermal, and stand respectively at 107°, 109° and 113° of Fahrenheit: the fourth is of the low temperature of 52° F. An analysis of the *Madeleine Spring* gives, in 28 Parisian pints, the following saline ingredients:

Free carbonic acid,	130 grains,
Carbonate of soda,	189 “
Sulphate of soda,	57 “
Muriate of soda,	145 “
Alumina,	62 “
Carbonate of lime,	116 “
Oxide of iron,	11 “
Carbonate of magnesia,	38 “

Total 748

The great bath, as it is called, has, in addition to the foregoing substances, silix in solution.

These waters are celebrated for their power of increasing the activity of the circulation, and augmenting expectoration and exhalation, restoring suppressed cutaneous eruptions and habitual discharges. Hence the reputation they have acquired in hepatic and psoric eruptions, chronic rheumatism and gout, and in secondary syphilis, amenorrhœa, &c. They are also esteemed

in chronic catarrh and bronchitis, and in catarrhus vesicæ, protracted fluor albus, paralysis not connected at the time with phlogosis of the brain or plethora of its vessels, anchylosis, and in all cases of rigidity of the joints.

Drinking the waters in the morning produces determination to the head, and in delicate subjects causes a species of intoxication. For the first few days they cause some febrile action, and diminish the appetite.

The water of the Great Bath (temp. 109° F.) is of much benefit in chronic rheumatism—used by immersion. The invalid should not remain in the bath more than 15 to 18 minutes.

Douching, from pipes of half an inch to an inch in diameter, is freely practised, at the height of five feet. It may be on all parts of the body, except the abdomen; but is more especially directed along the spine.

The waters are used, also, in the form of a lotion, to old ulcers, to favour their cicatrisation.

Tryaire and Jurine give the following formula for imitating the water of the Mont D'Or.

Water,	26 ounces,
Carbonic acid,	5 times this volume,
Carbonate of soda,	48 grains,
Muriate of soda,	24 “
Sulphate of iron,	1 grain.

According to M. Duchanoy, we may have artificial mineral water of the Mont d'Or, by putting in every pint of the water a drachm of carbonate of soda, and adding a drop at most of white petroleum; then we are to heat the water to 113° F., taking care to stir it. After filtering it we are to add half a drachm of the muriate

of soda; then acidulate the water with carbonic acid, and introduce a grain of sulphate of iron, and a little carbonate and sulphate of lime.

Vichi has ample accommodations, as well for lodging as for bathing and douching, and also a hospital for the poor. The season for taking the water is from the 15th of May to the 15th of September.

There are seven springs ranging in temperature from 72° to 114° F. The proportions of the saline ingredients vary in each. All contain, however, carbonic acid, carbonates of lime, magnesia, soda, sulphate of soda and muriate of soda.

The waters of *Vichi* are among the most celebrated in the kingdom. They are mainly adapted to chronic diseases, and in a more peculiar manner to abdominal affections, as of the stomach, liver, and spleen, marked by engorgement and obstructions. They are also greatly esteemed in fluor albus, irregular menstruation, and the tribe not easily defined of hypochondriacal complaints; also in disorders of the bladder and kidneys, and in obstinate intermittents, palsy, ankylosis, chronic rheumatism, and scrofula. Their more immediate effect is an increase of the flow of urine.

They are prejudicial to those of a dry habit and sanguine temperament; and they ought never to be employed in acute and inflammatory affections, or in those in which symptoms of irritation predominate.

It is customary for the invalid to drink from one to two pints of the water in the course of the morning. Sometimes it is mixed with milk or diluted with a simple mucilaginous fluid.

It has been remarked, and the observation has been made in the case of other mineral waters, that the effects of those of *Vichi* are not limited to the period

of residence at the springs; they are often sensibly displayed and felt for a long time after.

The artificial mineral water of Vichi is thus prepared by Tryaire and Jurine. The proportions are for a bottle of 20 ounces of water.

Carbonic acid,	twice the volume,
Carbonate of soda,	32 grains,
Sulphate of soda,	16 “
Muriate of soda,	4 “
Carbonate of magnesia,	$\frac{1}{2}$ grain,
Carbonate of iron,	$\frac{1}{4}$ “

Of the cold acidulous mineral waters those of *Seltz* are the most celebrated. They serve indeed as an example and illustration of the qualities of the class. The town of Seltz is on the Rhine, about nine leagues north east of Strasburgh and 126 east from Paris.

According to the analysis of the celebrated Bergmann, each kaune or $2\frac{3}{4}$ pints of the water contains

Carbonate of lime,	17 grains,
Carbonate of magnesia,	29 $\frac{1}{2}$ “
Carbonate of soda,	24 “
Muriate of soda,	109 $\frac{1}{2}$ “

The elastic aerial fluid, almost entirely carbonic acid, amounts to 60 cubic inches.

The medical virtues of the Seltz or Seltzer waters have been highly eulogised by Hoffman, who recommended them to be drunk in combination with milk or whey. They are cooling and diuretic, with some mild aperient properties; and have been administered with success in scurvy, bilious fevers, fluor albus, debility of the digestive organs, and in certain diseases of the skin.

These waters are an article of commerce in the

cities along the Rhine, and are in common use at table, either alone or, what the *bon vivant* prefers, mixed with the lighter wines.

The artificial Seltz water is directed to be made as follows by Tryaire and Jurine.

Water,	20 ounces,
Carbonic acid,	5 times the volume,
Carbonate of soda,	4 grains,
Muriate of soda,	22 “
Carbonate of magnesia,	2 “

What is called the mild Seltz water is that from which the carbonic acid has been expelled by heat, and with which a portion of hydrogen combines itself.

The formula of Swediaur for artificial Seltz water is

Pure water,	50 pounds,
Carbonate of lime,	2 drachms,
Carbonate of magnesia,	1 ounce,
Carbonate of soda,	6 ounces,
Muriate of soda,	1½ “

Add carbonic acid gas 900 to 1000 cubic inches.

In the city of Naples, in the quarter of Santa Lucia, there is a mineral spring which may be called carbonated sulphurous, since, with some saline matters, it has a liberal supply of both the carbonic acid and sulphuretted hydrogen gases. It is largely drunk in the spring season and early part of summer by the inhabitants. Cirillo attributes to this practice the comparative exemption of the Neapolitans from bilious fevers.

CHAPTER V.

Characteristic properties of chalybeate waters—their effects vary with the quantity of carbonic acid in excess, and of saline ingredients.—Their tonic power, how to be understood—their chief efficacy is in diseases of atony, after the subsidence and removal of inflammation.—Diseases in which chalybeate waters have been recommended.—Circumstances forbidding their use.—Artificial chalybeate waters.—Celebrated chalybeate springs of Europe.—Spa—its different springs—their composition, medical virtues, and general celebrity.—Pymont springs.—Tunbridge Wells.—Celebrated chalybeate waters of the United States.—Ballston Spa—Albany—Bedford—York—Frankfort, Pennsylvania.—Hopkinton, Massachusetts.—Yellow Springs, Ohio.

CHALYBEATE mineral waters owe their characteristic properties, chemical and medicinal, to an impregnation of iron. The oxide of iron is almost uniformly held dissolved by carbonic acid; the acid being usually in excess.

Chalybeate waters are limpid, inodorous, and have a peculiar styptic taste. Exposed to the air, they become covered with an iridescent pellicle, and a

quantity, generally minute, of ochry matter subsides; the water at the same time losing its taste. This change is accelerated by heat.

The effects of chalybeate waters are modified by the quantity of carbonic acid in excess, and of saline ingredients. One of the purest of the class is that of Tunbridge, in England. "In the celebrated Spa and Pymont waters, the impregnation of carbonic acid is so great, as very materially to modify the action of the iron; and in the Cheltenham water, the quantity of active saline matter is such, that it can scarcely be regarded as a chalybeate."

The tonic power of chalybeate waters is admitted by all, and yet misunderstood by a large number of persons who familiarly use them with that view. In cases of pure atony or feebleness, not the accompaniment of febrile irritation nor of inflammation of an organ, these waters have a very beneficial effect. They would seem to act more particularly on the absorbents, and indeed the entire capillary tissue, to which they communicate increased activity and power. Hence in persons exhausted by disease, and whose chief complaint is languor, with cool skin, and a pale and moist tongue, chalybeate waters have an admirable effect. Their tonic action on the stomach is participated in by all the other organs and tissues. But this diffusive sympathy implies, also, that with the augmentation of vital power of the animal economy generally there will be increased excitement of an already irritated or inflamed organ; and hence the effect of a chalybeate in chronic maladies may be considered as the test of the stage in which they are at the time. If there be merely the sequelæ of excitement and phlogosis, exhibited in dilated and enfeebled vessels

and engorgement, the chalybeate by its action on the capillaries and absorbents will remove this condition, and equalize and give strength to the circulatory apparatus; but if the sensibility of the part, with other phenomena of excitement, be still present, pains and febrile disturbance will result from the use of the remedy. It is therefore of much greater importance to attend to the stage than to the name of the disease, in prescribing chalybeate waters. Slowness of functional discharge and of sympathies between the organs are soon removed by chalybeates; they are brought up by this means to their proper standard, and placed in a suitable rhythm; but all excesses of functional action bordering on inflammation will be aggravated by it.

When, therefore, chalybeate waters are recommended to strengthen digestion, it is with the understanding that this function is not retarded by irritation of the stomach or intestines, or of the liver. They will be found useful in the sequelæ of hemorrhages and mucous discharges, provided the evacuation has been such as to cause general debility, and does not leave behind it a point of irritation, to which general excitement causes a speedy afflux of fluids, with augmented sensibility. This remark applies to hemoptysis, and menorrhagia, fluor albus, diarrhœa, chronic catarrh of the bladder, and old gonorrhœa—also protracted autumnal intermittents and associated dropsical effusions. In the second stage of scrofula, chalybeates have been used with benefit. For the cure of amenorrhœa and the removal of sterility, they have been always celebrated.

As regards their mode of administration, they are commonly taken as drink, in doses of two to three

tumblers full in the day. Their favourable operation is soon perceived in improved appetite, with, however, a slight feeling of giddiness, and at times drowsiness. Sometimes they oppress the stomach, give rise to pains in the epigastrium, nausea, colics, redness of the tongue, and heat of the skin, with occasional constipation, and at other times diarrhœa. The coming on of such symptoms requires an immediate discontinuance of the use of the waters, and recourse to a mild diluent—whey, or some demulcent. Persons with an irritable stomach ought to be very guarded in drinking chalybeate waters.

To be efficacious, they ought to be used at the spring, as, by transportation to a distance, they deposit almost entirely their iron.

Artificial chalybeate waters are prepared after various formulæ. Parmentier gives the following recipe, agreeably to which, we obtain an artificial water, equal to those of Vichi and Spa.

Introduce into two pounds of distilled water:

Carbonate of iron, 2 grains,

Carbonate of soda, 4 “

Carbonic acid gas, 2 or 3 times the volume of the water.

Ferruginous water, in imitation of those of Spa, Pyrmont, &c., by M. Swediaur.

Pure water,	50 pounds,
Carbonate of lime,	5 drachms,
Carbonate of magnesia,	10 “
Black oxide of iron,	2 “
Sulphate of magnesia,	6 “
Muriate of soda,	1 drachm.

Add,

Carbonic acid gas, 1000 cubic inches.

The most celebrated thermal chalybeate springs are those of Bourbon L'Archambault, in the department of the Allier, 65 leagues south of Paris. Their stimulating character is generally acknowledged. The accommodations are spacious, and the resort of company to this place great. They were known and highly prized by the Romans.

Amongst the cold chalybeate, the most noted in Europe are Spa, in the kingdom of Belgium; Pyrmont, in Westphalia; Forges, 25 leagues from Paris; Passy, near this capital; Tunbridge and Brighton, in England.

Spa.—The celebrity of the Spa waters over all Europe, will justify a few details respecting their composition and curative powers. By analogy we may also glean some useful hints to guide us in the use of our own chalybeates.

Spa, at present included in the kingdom of Belgium, is a small town, situated in a mountainous district which forms part of the forest of Ardennes: it is ten leagues from Aix la Chapelle, six from Liege, and seventy-five from Paris.

Spa is at the foot of a rocky mountain which looks to the north. Two projecting masses form a kind of amphitheatre, on which the town is built. The edifices, and places of public amusement are on an extensive, one might almost say, magnificent scale. The Redoubt, Vauxhall, and the house Levoz, have fine halls for theatrical performances, assemblies, sports, &c.

The manner of living at Spa is most agreeable; public amusements, parties, rural fetes, and promenades, succeed each other almost without interruption. Each person may, however, live as he thinks proper, either

by keeping away from dissipation, or by dividing his time between it and solitude.

The springs are to the number of seven, of which that called Pouhon is the principal. That of Watroz is almost entirely abandoned.

Deheers and Limbourg inform us, that after rainy weather, the waters of Spa lose much of their medical properties, being insipid to the taste, and without any of that pungency which they evince at other times.

The Pouhon spring is of the temperature of 50° F. The chemical analysis, by Bergmann, is as follows.

In a hundred pounds of water, there were found,

Crystallized carbonate of soda,	154	grains,
Muriate of soda,	18	“
Carbonate of iron,	59	“
Carbonate of lime,	154	“
Carbonate of magnesia,	363	“
	<hr/>	
	750	

A hundred cubic inches of the water contain 45 cubic inches of carbonic acid gas.

In 1816, Dr Jones analyzed the waters of Spa with very different results. We shall only give the chemical contents of the Pouhon spring. One gallon of 231 cubic inches gave as follows:

Carbonic acid gas,	262	cub. inches,
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Sulphate of soda,	0.99	grains,
Muriate of soda,	1.16	“
Carbonate of soda,	2.25	“
Carbonate of lime,	9.87	“
Carbonate of magnesia,	1.80	“
Oxide of iron,	5.24	“

Silex,	2.26 grains,
Alumina,	0.29 “
Loss,	2.94 “

Solid contents, 26.00

It is not for us to pretend to decide on this discrepancy of result. It has been asked, whether the water of Spa has undergone any change since the time of Bergmann, whether it was really the Pouhon water that he examined, or whether Dr Jones is not mistaken in some of his analyses?

The medical virtues of the Spa waters are very great, and their consequent reputation superior, perhaps, to that of any others in Europe. Their activity is proportionate to the quantity of iron and carbonic acid. The Pouhon spring is much charged with iron, and has the most powerful effect; that of Gèronstere seems to be the weakest of all.

The waters of Spa are tonic, aperient and cooling; they strengthen muscular action, and are efficacious in those diseases proceeding from weakness, and relaxation of the tissues. Limbourg recommends them in engorgement of the abdominal viscera, as of the liver, spleen and mesentery; and in jaundice, melancholia, hypochondriasis, acidity of the first passages, leucophlegmasia; and sometimes dropsy, paralysis, exhaustion, the consequence of masturbation or excessive venereal pleasures, and the impatience thence resulting; colics, borborygmi, eructations, hiccups, vomiting, depending on atony of the stomach, loss of appetite, old diarrhoeas, exhausting sweats, hysteria, excessive flow of the menses, fluor albus, chlorosis, sterility; in some ulcers, particularly of the liver, kidneys, and bladder; in nephritis and gravel; scurvy,

cachexy, hepatic herpes, itchings of the skin, obstinate intermittents, worms, old gonorrhœa; and finally, they are useful in the convalescence from acute disease.

A long list this, in perusing which, it must readily occur to most readers, that a nice distinction of stages of disease and particular constitutions would be requisite, before the invalid could venture to use these waters. We but give the outline.

They are dangerous in all inflammatory diseases, even in their forming state; in inveterate scirrhus, phthisis pulmonalis, and marasmus kept up by internal abscesses; also, in epilepsy and apoplexy. They are hurtful to plethoric and irritable habits.

Analysis and experience both point out, that the medical properties are different at the different springs.

The Spa waters are used as drink. Particular cases may require their employment as baths. It is customary to begin with three or four glasses of water, and augment the quantity gradually to twelve or fifteen—but there would be risk in going beyond this. In doubtful cases, the patient should commence the use of the weakest spring. Milk used with the water is a very salutary remedy against scurvy, itch, herpes, scorbutic phthisis. The first effects of the waters are vertigo, and a drowsiness.

The thermal waters of Aix la Chapelle and of Chaud-Fontaine, which are near Spa, are often useful or necessary before or after the use of those of Spa, or their use may be alternated with advantage.

Artificial mineral water of Spa, by MM. Tryaire and Jurine:

Pure water,	20 ounces,
Carbonic acid,	5 times its volume,
Carbonate of soda,	2 grains,
Muriate of soda,	$\frac{1}{2}$ grain,
Carbonate of magnesia,	4 grains,
Carbonate of iron,	1 grain,

Pyrmont.—This town is situated near the river Weser, four leagues from Hamelet, in Westphalia. It has been celebrated many centuries on account of its mineral waters.

There are six principal springs—all of the temperature of 55° F. The water is of greater specific gravity than pure water.

By the analysis of the *Pyrmont* waters, by M. Westrumb, 100 pounds of this water give,

Crystallized muriate of soda,	122 grains,
Muriate of magnesia,	134 “
Crystallized sulphate of soda,	547 “
Carbonate of iron,	105 $\frac{1}{2}$ “
Carbonate of lime,	348 $\frac{3}{4}$ “
Carbonate of magnesia,	339 “
Resinous principles,	9 “

2762 $\frac{1}{4}$

A hundred cubic inches of this water contains 187 $\frac{1}{2}$ cubic inches of carbonated acid gas, or 100 pounds of water contain 1500 grains of carbonic acid.

From this it appears that few other mineral waters contain so many substances in solution.

The *Pyrmont* waters are said to be eminently tonic; and hence they must be prescribed with extreme caution. In those chronic derangements of the abdominal viscera without much irritation, in hypochondriasis

and chronic jaundice they have been found useful; also in obstructed menstruation, and the complaints consequent on this cause.

Mixed with wine, this water is said to form a very pleasant beverage; or it is still more refreshing, in hot weather, when united with strawberry syrup.

As in the case of the Spa water, it is best to begin in doses of half a pint, which may be subsequently increased to a considerable extent.

Artificial mineral water of Pyrmont, after MM. Tryaire and Jurine:

Pure water,	20 ounces,
Carbonic acid,	5 times its volume,
Muriate of soda,	2 grains,
Carbonate of magnesia,	12 “
Sulphate of magnesia,	8 “
Carbonate of iron,	1 grain.

The waters of Tunbridge Wells, though very weak in saline and ferruginous ingredients (one gallon containing in all but $7\frac{1}{2}$ grains), have obtained great reputation in England. They are thought to be particularly applicable to “dyspepsia from debility of stomach with languor and nervousness, uterine debility, chlorosis, cutaneous complaints, especially of the scaly species, connected with weakness of stomach; gravel, founded on unhealthy condition of the digestive organs.”

Dr Scudamore, who has written on these waters, tells us that on all occasions some aperient medicine should be premised; after which, the patient is to take the first dose at seven or eight o'clock in the morning, the second at noon, and the third about three in the afternoon. The quantity must vary with the case; but it is best to begin with small doses, taking in all from half a pint to two pints daily.

In the United States, there are a great number of chalybeate springs; the most noted of which are, those of *Ballston* and *Albany*, in the state of New York; *Hopkinton*, in Massachusetts; *Bedford*, *Pittsburgh* and *Frankfort* in Pennsylvania. Virginia, Kentucky, Tennessee, and Ohio, can also boast of waters of the same class.

The reputation of the Ballston and Saratoga waters is known to every citizen in the union. The first, or Ballston Spa, are those coming more immediately under the head of chalybeate; of the latter, I shall soon have occasion to speak. Any minuteness of detail respecting these waters, however, is rendered unnecessary, on the present occasion, by the interesting little volume of Dr Steel, just published.* Though not prepared to speak of the entire accuracy of this gentleman's analysis and medical directions, we must all be disposed to put confidence in his statements, strengthened as they are by observations made for more than twenty years of "professional life on the spot."

Into the history of the Ballston and Saratoga springs, it cannot be expected of me to enter; this will be found in Dr Steel's work, in which, also, are given "Geological Remarks," "A Description of the Springs," and a detail of the experiments made in analyzing the waters. What more immediately relates to my present purpose, are their chemical composition and medical virtues.

The springs at Ballston are numerous, and present differences in the nature and proportion of their saline

* An Analysis of the Mineral Waters of Saratoga and Ballston, with practical remarks on their Medical Properties, &c. &c. By John Steel, M.D. Saratoga Springs, 1831: pp. 203.

ingredients. The water of the *Sans Souci Spring* "is sparkling and acidulous, and its taste highly chalybeate and somewhat saline." In specific gravity, it differs little from pure water, being to the latter as 1005.7 is to 1000. The temperature was 50° F.; the open air being at the time 20° F. above zero, or 12° below freezing point.

"One gallon, or 231 cubic inches of the water from this spring, contains the following substances:

Chloride of sodium (common salt),	143.733
Bi-carbonate of soda,	12.66
Bi-carbonate of magnesia,	39.1
Carbonate of lime,	43.407
Carbonate of iron,	5.95
Hydriodate of soda,	1.3
Silex,	1.

Solid contents in a gallon, 247.15 grains."

A knowledge of the presence of the iodine in these waters is a discovery of late years. It is exhibited in the form of hydriodic acid combined with soda.

Low's Spring differs but little in sensible properties or composition from the *Sans Souci*.

Park Spring "affords a much less quantity of all the saline substances excepting the iron, with which this water is undoubtedly saturated. From one gallon," Dr Steel "obtained 4½ grains of the pure oxide of iron, equivalent to 6½ grains of the carbonate of iron (a quantity unexampled in any of the other springs); and the water not holding so large a quantity of the saline ingredients in solution, it constitutes one of the purest and best samples of *acidulous chalybeate* waters which can any where be found; and in all cases where simple chalybeates alone are recom-

mended, this water should undoubtedly have the preference."

The water of the *New Washington Spring* has a specific gravity of 1004.6, pure water being 1000, and a temperature of 51° F. One gallon contains, according to Dr Steel, the following articles, viz.

Chloride of sodium,	89.83
Bi-carbonate of soda,	18.057
Bi-carbonate of magnesia,	42.042
Carbonate of lime,	41.51
Hydriodate of soda,	0.7
Carbonate of iron,	3.71
Silex and alumina,	1.25

Solid contents in a gallon, 197.099

On the same authority, we are told, that "all these waters, if drunk in large quantities, or taken by persons whose stomachs are rather irritable, operate as an aperient, and, at the same time, have a powerful effect as a diuretic, and are of eminent service in all those chronic affections where chalybeate medicines are indicated."

There are springs at Saratoga differing but little from the Ballston Spa, viz. the *Flat Rock, Columbian, High Rock, and Ellis's Springs*; they have, however, this additional advantage in their excess of carbonic acid, by which they are less apt to offend the stomach, and are more beneficial in disorders of the kidneys. It is indeed difficult to class the Saratoga waters. I have arranged them under the head of *saline*, though, considering the iron which they all contain, and the abundance of carbonic acid, they might well rank as acidulous chalybeate waters. Be this as it may, I shall reserve the remarks which I have

to offer on their virtues, until I come to speak of the class of saline waters.

The *Bedford* are the most noted springs in Pennsylvania. They are within two miles of a town whence they derive their name, and which contains upwards of a thousand inhabitants. It is the seat of justice for Bedford county, and is situated on the great western turnpike which passes through Pennsylvania from Philadelphia to Pittsburgh—being 195 miles from the former, and $93\frac{1}{2}$ from the latter city. It is 130 miles from Baltimore and the same distance from the Federal City. The valley (Shover's), in which the springs are situated, lies between Constitution hill on the east, and Federal hill on the west: it is watered by Shover's creek, which passes through it, and discharges itself into the Raystown branch of the Juniata river about a mile east of the town of Bedford.

The principal springs are *Anderson's* or the Main Spring; *Fletcher's* or the Upper Spring; the *Limestone* Spring; the *Sweet* Spring; the *Sulphur* Spring; and the *Chalybeate* Spring.

For an account of the composition of these waters and their medical virtues, I am indebted chiefly to Dr Church, whose account, forwarded to me by Dr Watson of Bedford, may be presumed to have received the sanction of this latter gentleman. The experience of Dr Watson of the benefits obtained by the use of the Bedford waters must be great; and we have to regret that he has not more formally and in detail laid it before the public.

A gallon of the water from Anderson's Spring contains, according to Dr Church, the following substances.*

* Dr Church's estimate is of a quart. I give a gallon, preserving,

- Sulphate of magnesia (Epsom salts),	80 grains,
Sulphate of lime,	14½ “
Muriate of soda (common salt),	10 “
Muriate of lime,	3 “
Carbonate of iron,	5 “
Carbonate of lime,	8 “
	—————
	120½

Carbonic acid gas, 74 cubic inches. Temperature of the water 55° F.

As a mere chalybeate, the Bedford water is of nearly the same strength as the Ballston and Saratoga waters. As a saline chalybeate it contains less common salt than these, but has in return a decided impregnation with Epsom salt, by which it is better fitted to act on the kidneys and bowels, and with less heat and irritation. Though, as far as we can yet learn from analysis, this water contains no hydriodate, it has the muriate of lime, an active salt. It contains also less free carbonic acid than the New York springs; and on this account is less immediately exhilarating; but it is also less stimulating and not so liable to affect the head as the latter.

The discovery of the curative powers of the Bedford Springs is of comparatively recent date. In the year 1804 a mechanic of the town, when fishing for trout in the creek already mentioned, had his attention forcibly drawn to the beauty and singularity of the waters flowing from the bank near him. He drank freely of them, and was not long in experiencing a purgative and sudorific operation in consequence. This man had been distressed for many years with rheumatic pains and formidable ulcers on his legs.

of course, proportions, so as to allow of a more direct comparison with the Ballston and Saratoga springs.

He was of course not a little pleased to find, that on the night ensuing his mineral draughts, he was much less disturbed with pains, and slept more tranquilly than usual. The unexpected relief obtained induced him to drink of the waters daily, and to bathe his legs in the gushing stream. In a few weeks he was perfectly cured. The happy effect of the water on this patient induced others labouring under the same and various other maladies to visit the spring. In the summer of 1805 a great number of valetudinarians came in carriages and encamped in the valley. This first noted spring is the one now called Anderson's.

At this time the improvements at the springs are extensive and beautiful, and are annually increasing "by the appropriation of all the *yearly taxes and contributions* received from visiters using the waters."

In continuation of the account of the accommodations, walks, &c. in the neighbourhood of the springs, I shall avail of the following description by Dr Church.

"On the east side of Federal hill, are pleasantly situated two large, airy, and convenient buildings, each two and a half stories high, and one hundred and thirty feet long. In these buildings is a large drawing room, splendidly furnished; a large dining room, in which upwards of two hundred persons can conveniently dine at one time;* bed chambers for single persons, families, &c. and every conveniency is appended to the buildings. South of this, in the valley, is erected a large frame building, two stories

* The public houses at the Springs and in town can conveniently accommodate five hundred persons at one time.

high, and one hundred and forty feet long, in which the family of the resident at the Spring resides. Cooking, &c. is done in the lower story of this building. Bed chambers occupy a principal part of the upper story. This house has fine walks in front, and is surrounded by a neat fence. Just in front of this building is a statue of the Goddess of Health, raised on a pedestal. From the stock which supports her, constantly issues a stream of the spring water, which, if the day is not windy, the figure catches in a bowl. This has a fine appearance. It is surrounded by a balustrade.

“Houses for the cold, shower, and warm baths are erected, in which there is every accommodation for taking the baths, and an attentive and obliging bath keeper takes charge of the establishments. The water that supplies the warm bath is conveyed from the upper spring, through a tunnel, which passes under the channel of Shover’s creek. The same tunnel supplies a trough for watering horses; and I was credibly informed, that the use of the water cured the botts, the hide bound, and other diseases of horses; and that that noble and valuable animal becomes remarkably fond of the water after drinking it a short time.

“To describe the serpentine and beautiful walks up Constitution hill; the artificial lake of fresh water, on which small boats can pleasantly sail; the small artificial island in the lake, on which the managers intend to plant choice shrubbery, and the other improvements, would extend this lengthened paper, so as to tire the reader. I shall therefore pass them without further notice; and conclude by observing,

that although I cannot say, with Dr Goldsmith, in his 'Deserted Village,'

' Here smiling Spring its earliest visits pays,
And parting Summer's lingering bloom delays;'

yet I can with great justice say: here nature has formed the scenery truly picturesque and romantic; and art has harmoniously combined with her in rendering it still more beautiful; here also 'the chemist, the geologist, the mineralogist, the botanist, the landscape painter, and the general lover of nature, will find much to employ, amuse, delight, and reward attention, or beguile the tedium of valetudinary habits and distresses;' and that the facilities for travelling to and from the cities, by turnpike roads, &c., good accommodations, scenery, climate, the efficacy of the waters, &c., all combine to render Bedford one of the principal watering places in the United States."

The Board of Managers of the Bedford Springs have published, in the form of a circular, a notice of the virtues of the waters in various chronic diseases: the opinions there advanced are, it may be presumed, on good medical authority. To the following we may subscribe, with the understanding and reservation already recognized respecting the absence of febrile irritation, and undue local excitement and pain, — circumstances which clearly forbid the use of these waters.

“The Bedford waters, drunk with proper precaution respecting quantity, temperature, diet, and exercise, accompanied with the judicious use of the baths, are found to be salutary in most states of chronic disease. In hepatic affections, in diseases of the stomach and intestines, in dyspeptic and hypochondriacal derangements, in hemorrhoids, and in all the varieties of intestinal worms, the water has effected

numberless cures. In secondary diseases of the lungs, originating in the sympathies of those organs with the stomach and liver, the cures have been equally certain. This class of disease is marked by the general symptoms of pulmonary consumption, asthma, &c.; but when these diseases have their primary seat in the lungs, these waters have been found to be useless, excepting in the forming state of primary consumption, in which they have done well. In the diseases of the skin and of the kidneys, and especially in calculous and gravelly affections, they have been very efficacious. In rheumatism of weak excitement, in anasarca and the various uterine diseases, as obstructions of the menstrual flux, its excess, the fluor albus, painful menstruation, &c., many cures have been effected, whilst its use has been generally beneficial. In diabetic and gouty complaints, it has been used with great profit. In the debility following the cure of acute diseases, or the remedies necessary to remove them, and in the weakness consequent on the cure of syphilis by mercury or otherwise, the Bedford waters have been found to be good restoratives. In all those chronic affections, which are too often the consequence of acute diseases in southern climates, and especially those of a bilious character, these waters, together with the bracing vigour of a mountainous atmosphere, effect the most happy changes."

The chief and, I should say, primary condition for the invalid's being able to drink the Bedford waters with advantage, is an absence of heat and pain in the stomach, of feverish thirst, and of dried and furred tongue. Pending the stage of febrile irritation in bilious affections, the waters will only aggravate the condition of the patient, and convert a chronic into an acute disease. Such a result is more likely to

be produced in a person of a rigid fibre and irritable temperament. Among other cases corroborating this opinion is the following. An elderly gentleman of my acquaintance, of a gouty habit and subject to frequent pleuritic stitches associated with derangement of the hepatic functions, visited the Bedford springs for the recovery of his health. The excitement caused by travelling, and the too hasty use of the water after his arrival, brought on a high fever with the usual complication of diseased lungs and liver, by which he was brought very low. The skilful attentions of the physician at the springs raised him from this dangerous condition; after which, during convalescence, he had once more recourse to the waters with decided and permanent benefit.

The fever which may arise from drinking the waters by an invalid whose viscera were previously in a torpid and engorged state, need not excite apprehension, if it be not accompanied with local pain and augmented disturbance of function. Should such effects result, the use of the waters must be suspended for a time, and the patient put on the use of diluents, and perhaps subjected to a small bleeding or two.

In fine, on summing up the recommendations in favour of a visit to the Bedford springs, we may cite to the inhabitants of the sea board, distance and the consequent obligation to travel, pure air and mountain scenery, with an opportunity for exercise on foot, horseback, or in carriage, general exemption from most of the absurdities of fashion, and in their stead communing with nature by the study of her works, and the pleasures of classifying them, under the heads of geology, mineralogy, and botany, and curious meteorological phenomena. Man in such a spot feels and enjoys

his freedom; in the crowd and dissipated haunt, he feels his slavery, despite all the blandishments of flattery.

Within a moderate day's ride of Bedford is the little town of Bath, in Berkeley county, Virginia, the mineral water of which has acquired considerable celebrity in that part of the country. It is a carbonated water of the temperature of 76° F. and has been found serviceable in dyspeptic and chronic diseases of the bowels; also in chronic rheumatism, used as a drink and for bathing. It is common for invalids to divide their time between Bath and Bedford; and on many occasions the arrangement is a good one. They, whose diseases are still marked by excitement and local pain, might prepare themselves, by drinking the Bath water, and bathing in it, for the use of the more stimulating waters of Bedford. In chronic rheumatism and eutaneous diseases, the alternate use of the waters of the two places would be particularly serviceable.

Within four miles of *Pittsburgh* is a chalybeate mineral spring, described and analysed by Dr Meade.

“When the water remains undisturbed for a few hours, it is covered with a white pellicle; its taste is lively and rather pungent, with a peculiar ferruginous flavour, and it exhales an odour of sulphuretted hydrogen gas. Its temperature is very generally uniform, and is of 54° F. The specific gravity of the water differs little from the purest water, and is as 1002 to 1000.

According to Dr Meade's analysis, it contains muriate of soda, 2 grains; muriate of magnesia, $\frac{1}{2}$ grain; oxide of iron 1 grain; sulphate of lime, $\frac{1}{2}$ grain; carbonic acid gas in one quart of water, 18 eubic inches.

Dr M. thinks this water even superior, in a medi-

cial point of view, to the water of the *Schooley's Mountain* spring, which has long sustained a high character for its chalybeate properties."

The *York Springs*, in Pennsylvania, once enjoyed considerable reputation; but, as in matters of even more importance, fashion, ever fickle, has pointed the way to other hygienic founts; and the crowd, the many, must of course follow.

The town of York is 106 miles from Philadelphia and — from Baltimore, and is situated in a fertile and well cultivated country. One pint of the water of the chief spring contains 1.20 grains sulphate of magnesia, 6 grains sulphate of lime, and 4 muriate of soda.

The chalybeate spring is represented to contain $2\frac{1}{4}$ grains of iron to every pint of the water. If this account be correct, it would be among the strongest chalybeates known.

The York water acts as a diuretic and mild cathartic, and subsequently has an effect on the skin in promoting perspiration.

The *Yellow Springs*, from their readiness of access by the inhabitants of Philadelphia, are much resorted to in the summer months. The water is chalybeate, and represented as excessively cold, though, in fact, its temperature is not less than that of the well water in the same district of country, viz. 52° F. The vulgar and prevalent notions about the tonic power of the cold bath—a desire to try novel impressions—indolence—and imitation, have severally induced many visitors to bathe in the water of the Yellow Spring. The results are often such as might have been expected; relapse and aggravation of prior maladies, or the supervening of new ones, bearing no small proportion

to the benefits and cures by the practice. With a love of the marvellous, in whatever relates to the cure of disease, and a singular indisposition to look in any other than one direction—the public consent to regularly forget and be blind to the former series of unfavourable effects, and only think of the latter.

If visitors, in general, would be content with obtaining the unquestionable benefits from change of air and scene, and free exercise over hill and dale, with perhaps an occasional draught of the chalybeate water of the Yellow Spring, it would be a much more rational course than idly to use the cold bath, and gamble away their health, when the chances are so greatly against them.

The Brandywine Springs claim the notice of Philadelphians and Baltimoreans, and of the inhabitants of the adjoining counties, as well on account of the curative powers of the waters, as of the facility of access to them, and the admirable accommodations for both the invalids and the healthy. These springs are within a short distance of Wilmington. Persons desirous of visiting them, are landed from the steamboat and transported in stages without delay to the springs. The adjoining country is represented as extremely picturesque, and affords fine walks or rides in carriage or on horseback, according to the strength and tastes of the invalid.

Public attention has been directed of late years, by Dr Church of Pittsburgh, to the *Frankfort* mineral springs.

Cave spring, which is the most considerable, and to which there is the greatest resort, is very romantically situated within a large cave, on the farm of Mr John Stevens, in Hanover township, Beaver county, Penn-

sylvania, about twenty six miles south west of Pittsburgh, and about one mile and a half north east of the village of Frankfort. The cave is a great natural curiosity. It is excavated by nature out of a large hill, and is about sixty feet below the surface of the earth. It is overhung, and in some places arched over with large flat rocks, which are covered with calcareous incrustations, strongly impregnated with the sulphate of iron and alum.”*

The water of Cave spring would seem, from the analysis of Dr Church, to contain the following substances: carbonic acid, carbonate of iron, carbonate of magnesia, sulphuretted hydrogen gas, muriate of soda, and a minute portion of bitumen.

Leiper spring, within a quarter of a mile of Frankfort, “holds in solution rather more carbonate of iron and muriate of soda, less carbonate of magnesia, the same proportion of sulphuretted hydrogen gas, carbonic acid, and bitumen, than Cave spring.”

In illustration of the medical powers of these springs, I shall let Dr Church give his experience in his own language.

“The water of Frankfort, when taken from the spring, is remarkably limpid and cool, but after standing a few hours exposed to the air, becomes turbid, and deposits a sediment. Its taste is hepatic and slightly empyreumatic. When first drunk, it sometimes excites nausea and vomiting. I saw two persons vomit freely, one of whom threw up great quantities of bile. • They staid only two days and were much benefited. The first glass I drank excited nausea, and with difficulty I refrained from vomiting.

* Philadelphia Medical and Physical Journal.

The water, however, mostly sits well on the stomach. I have seen some individuals drink as much as two or three quarts, in the course of an hour, without feeling a sensation of weight or coldness at the stomach. It generally operates two or three times on the bowels, and very copiously by the kidneys. I have frequently myself drank half a gallon of it in half an hour, without experiencing the least gastric distress. It usually produced copious watery evacuations from my bowels, and acted powerfully as a diuretic. Even with those in whom it at first excites nausea and vomiting or vertigo, and slight ebriety, which last occasionally happens, after the first two or three trials, it proves agreeable. It regulates the bowels, strengthens the stomach, improves the appetite astonishingly, clears the skin, promotes a pleasant diaphoresis, and great freedom of urination.*

“Drinking the water, with the use of the cold shower bath, has been of great service to persons labouring under chronic rheumatism, gravel, dyspepsia, asthma caused by gastric irritation, general debility of the system, and to convalescents from bilious fever and liver complaints. The use of the water alone has cured several cases of cutaneous affections, such as herpes, psora, &c.

“I met one morning a man climbing up the steps, who told me, that for the last four months he had been

“*A respectable lady of my acquaintance was so powerfully affected by vertigo, after drinking the first two glasses, that in attempting to take a walk in the garden, she fell, and was carried to bed, from which she recovered in about an hour. By taking small quantities of the water for a few days, it sat afterwards well on her stomach, and was of essential service. This lady ultimately drank half a gallon during an hour, which excited no unpleasant symptom. After drinking it, I have more than once felt quite drowsy, which was succeeded in half an hour by an agreeable exhilaration of spirits.”

so crippled by rheumatism, that he was compelled to resort to crutches, and for the cure of which complaint, the ordinary remedies had proved wholly unavailing. He had been only ten days at the springs, and was so much benefited by the waters and bath, that he was then able to walk without crutches tolerably well. The next week he returned to his family, and resumed his trade, that of a butcher.

“Mrs. W. of Pittsburgh, who was unable to walk across her room for several months, went to the springs and staid two weeks, during which time her general health was very much improved, and she recovered in a great degree the use of her limbs. I met with several persons, attending the springs for the rheumatism. They all informed me, that they were more or less relieved.

“From the year 1815, I had been sorely afflicted with the hæmorrhoids, for the cure of which the most approved remedies were tried without permanent advantage. During the past summer, in particular, the pain and irritation were often so great, as to cause me to pass many sleepless nights. I arrived at the springs the 30th of August last, and as usual, the hæmorrhoids prevented me from sleeping that night. The next day I commenced drinking the waters, and on the 4th of September following, I found myself completely well. Nor have I since, though nearly six months have elapsed, had any return of the complaint. I have heard from several persons, who, in a similar condition, were as promptly relieved.”

The Hopkinton Springs, in Massachusetts, have obtained some reputation in that section of country, as I learn from Dr Bueklin, for the cure of scrofula, and various affections of the skin. When analysed by

the late Dr Gorham, the water of the chief spring was found to contain carbonates of lime and magnesia, and also carbonate of iron. Another one is highly impregnated with sulphur. Bathing in the waters is also recommended and practised.

· *“Schooley’s Mountain Chalybeate Springs.—* Schooley’s Mountain is a part of the granitic chain, extending in a north east and south west direction nearly across the state of New Jersey. Its height is more than six hundred feet from its base, and not more than eleven hundred feet above the level of the ocean. This elevation is sufficient to influence the temperature of these springs. The temperature of the water of the copious springs near the top of the mountain is only 50°, while that of the deepest and coolest wells in New York is 54° Fahr. These mineral springs are situated between two beautiful wooded mountains, and issue from a fissure of the perpendicular side of a rock, and the quantity of water gushing from this fissure may be estimated at six hogsheads per day.

“ According to Dr W. J. M’Neven, this water contains extractive, 0.92; muriate of soda, 0.43; muriate of lime, 2.40; muriate of magnesia, 0.50; carbonate of lime, 7.99; sulphate of lime, 0.65; carbonate of magnesia, 0.40; silix, 0.80; carbonated oxide of iron, 2.00; loss, 0.41.

“ This water has been found advantageous in calculous concretions, and when the urine is blackened by it, is always held as a favourable symptom of its operating beneficially. The quantity generally drunk is from ten to twenty half pint tumblers a day. One of the great advantages of this water, is that the carbonic acid it holds is altogether in a state of combination, and to this is generally ascribed its never pro-

ducing flatulence or spasm in the weakest stomach, while it acts as a tonic like other chalybeates.”*

Of the *Yellow Spring* in Ohio, I cannot give a better account than in the language used by Dr Drake, in his interesting and instructive work, “*The Picture of Cincinnati and the Miami Country.*”

“The most noted watering place in the Miami country, is the *Yellow Spring*, in Green county, 64 miles from Cincinnati, and two from the falls of the Little Miami. It is a copious vein which bursts from a fissure in the silicious limestone rock, and is, at the distance of a few rods, precipitated into a ravine more than a hundred feet deep. On its passage thither, it has deposited an immense bank of brownish ochre, blended with leaves, twigs, and other vegetable matter. The brook which flows along this wild and narrow valley, falls over many successive ledges, which adds much to the interest of the scene. Its margin is fringed with a variety of beautiful shrubs, whose broad and heavy foliage affords an agreeable contrast with the slender leaved cedars that adorn the rocks above. A quarter of a mile below the spring, this brook is joined by another, flowing in a similar valley. Along this, a number of excavations have been unsuccessfully made in search of ores. Among these there is one, five or six feet deep and as many in diameter, which was dug at a period altogether antecedent to the settlement of this country by the Anglo-Americans; but whether by the French or the ancient inhabitants, is quite uncertain. The val-

* Edwards' and Vavasseur's Manual of Materia Medica: translated by J. Togno, M.D. and E. Durand. The translators do not mention the quantity of water at Schooley's Mountain which contains the above saline ingredients.

ley of these united streams exhibits to the geologist the transition from the common to the silicious limestone strata—and a visit to the falls of the Little Miami will afford several charming prospects. Upon the whole, a tour to the Yellow Spring will amply repay the traveller, if not the invalid; and amuse those who are in health, if it do not in many cases heal the infirm. As to the fountain, it is transparent, emits no air bubbles, and has the temperature of 52 degrees, which is that of the springs in its vicinity. Its taste is that of a slight chalybeate, and the examinations which have been made, indicate it to contain a portion of oxide of iron and carbonate of lime, dissolved by the agency of carbonic acid gas. In its other saline impregnations, it appears to have no excess over the springs of the Miami country generally; it is used for domestic purposes, and its sensible effects on the human system appear to be inconsiderable. In those cases of chronic disease and debility, where a chalybeate is proper, it has, however, been used with advantage.”

CHAPTER VI.

The immediate effects of saline mineral waters— their chief composition—in what manner they are useful in various chronic affections, as of the liver and other abdominal viscera, and of the skin and kidneys.—The principal thermal saline waters.—Plombieres—the temperature and mineral ingredients of its waters, and their medicinal properties.—Those of Bourbon-Lancy, Carlsbad, Töeplitz and San Julian similarly considered.—Cold saline mineral springs.—Cheltenham waters—for what most celebrated.—Epsom and Sedlitz springs—the great virtues of the latter as set forth by Hoffman.—The Saratoga waters—their compound at ur e—their composition and medicinal properties.—The Harrodsburg springs—the chief saline ingredients in their waters—the general effects and operation of these latter.—Sea water—its saline ingredients and efficacy when used internally as medicine.

UNDER the class of saline mineral waters are comprised those in which there are neutral salts enough to produce a marked and generally purgative operation. The salts most usually present are the sulphates, muriates, and carbonates—such as the sulphates of magnesia and soda, muriates and carbonates of soda

and lime. The proportion of aerial matter is seldom large.

When there is a considerable addition of carbonic acid in these waters, they become more grateful, and sit easier on the stomach. With an impregnation of iron they acquire tonic and stimulating powers, and are used with other views than merely to their purgative operation.

Saline waters have not a direct effect on the sanguiferous and nervous systems. Their efficacy mainly depends on their laxative operation, by which the entire digestive canal is stimulated to a free secretion from its mucous surface; and the adjunct secretory organs of the liver and pancreas are correspondingly excited to pour out their appropriate fluids. In addition to their operation on the bowels, we cannot be unaware of their being in part absorbed and carried into the round of the circulation, and in this way acting on the capillary tissue throughout the body, and also on the secreting organs. A knowledge of the sympathy between the digestive canal and all the other organs of the body would prepare us for witnessing the effect which mineral waters have on the latter, in virtue of their operation on the former. One great drawback to the salutary tendency of purgative medicines, when derived from either the vegetable or mineral kingdom, and given in full doses, in their causing greater irritation of the stomach and bowels, is avoided when the saline combinations in this class of mineral waters are used. It has always been remarked, too, with regard to these waters, that their cathartic power is greater than could be supposed from the extent of their saline impregnation, as determined by analysis;

a proof of the influence of dilution, and of the diffused impression produced, in consequence, on the digestive tube.

Provided, then, that there be no marked irritation or phlogosis of the mucous membrane of the stomach and bowels, saline mineral waters drunk in sufficient quantity will have the effect of relieving congestion and irritations of remoter organs, as well by evacuation of fluids, as by derivation of blood from them to the superficies of the system of the vena portæ. Affections of the head, chest, skin, and joints, will all be severally benefited by the judicious use of the waters in question.

Another advantage claimed for these natural medicines in doses short of purging is, that while mildly stimulating the secretory vessels of the digestive surface to an increased discharge of fluids, and the canal itself to a frequent expulsion of its contents, they do not produce a morbid sensibility by which alimentary matters coming after them would irritate and fail to undergo the requisite changes in digestion. On the contrary it is alleged, that this process goes on vigorously, and that the absorbent tissue is just stimulated enough by the saline ingredients in the water to enable it to imbibe with avidity the fluid elaborated from the aliment which had been taken into the stomach, and to carry it with despatch into the circulating system.

Resulting as well from this absorption of saline matters and their distribution to the glandular tissue and capillaries of the body generally, as from the action sympathetically communicated to these parts from the digestive mucous surface, is an increase in the secretions from the kidneys and skin. This effect

more usually follows, however, smaller quantities of mineral waters than are drunk to produce purging.

Here, again, is a marked advantage in this mode of administering saline compounds over the full and heroic doses in medical practice. By the latter, as when a large dose of salts is taken, the afflux to the mucous surfaces and subsidiary glands is great, and the skin is in consequence often pale, and deficient in activity of capillary circulation and extent of its appropriate secretions; or if there be a reflux, it is from irritation consequent on that of the stomach and intestines, caused by the too active purging. Small doses of saline medicines largely diluted with water, on the other hand, are found to have an immediate effect on the functions of the skin, which they mildly promote, especially if moderate exercise and the occasional use of the warm bath be adopted in conjunction with the saline draughts. In the same manner we may explain the beneficial effects of saline mineral waters on the mucous surface of the lungs, and on the serous, synovial, and fibrous membranes—as in chronic catarrh and asthma, rheumatic affections of the joints and limbs, &c.

The waters of the saline, like those of the preceding class, are both thermal and cold. Of the thermal, the most celebrated are those of *Plombières*, *Bourbonne-Les-Bains*, *Balaruc*, *Bagnères-Adour*, *Bourbon-Lancy*, in France; of *Carlsbad* and *Tœplitz*, in Germany; of *Lucca*, *San Julian*, and *Monte Catini*, in Italy.

Plombières, in the department of Vosges, 90 leagues from Paris, is greatly indebted for many of its comforts and conveniences to Stanislaus, king of Poland, who built a small hospital, and arcades under

which invalids can promenade. The period, or season as it is called, during which the waters ought to be drunk by a sick person, lasts six weeks. If, after this, a farther use of the water should be thought necessary, a fortnight's remission is recommended before resuming it. There are natural warm, hot, and vapour baths in this place.

According to the analysis by Vauquelin, a pint of the water of the Plombieres' springs contains the following substances.

Carbonate of soda,	$2\frac{1}{6}$ grains.
Sulphate of soda,	$2\frac{1}{3}$ “
Muriate of soda,	$1\frac{1}{4}$ grain.
Silex,	$1\frac{1}{3}$ “
Carbonate of lime,	$\frac{1}{2}$ “
Animal matter,	$1\frac{1}{2}$ “

The thermal saline waters of Plombieres when drank are stimulating, and quicken the circulation. They are recommended, internally, in debility of the stomach, slow digestion, nephritic colic, amenorrhœa associated with atony of the system, fluor albus, visceral engorgements, and deranged or perverted secretions generally.

Externally, by bath, these waters are efficacious in repelled itch and herpes, debility accompanying and caused by nocturnal pollutions, simple and gouty rheumatism, paralysis, white swellings, incipient anchylosis, obstinate ulcers.

They are forbidden in all diseases of predominant irritation, in pulmonary consumption, and phlogosis of the stomach and intestines, hæmoptysis, epilepsy, continued fever, and internal abscess.

Sometimes there are breakings out or boils on the

skin from using the bath of Plombieres' water, which, however, soon disappear.

The descending douches are from 12 to 14 feet high, with a pipe of from 4 to 5½ lines diameter. The ascending douche is employed with success in diseases of the rectum and neck of the uterus, and also in fluor albus.

Tryaire and Jurine give the following recipe to prepare artificial mineral water of Plombieres.

Water,	20 ounces.
Carbonic acid,	$\frac{1}{20}$ of this volume.
Carbonate of soda,	1½ grain.
Sulphate of soda,	1½ “
Muriate of soda,	1 “

The waters of *Bourbon-Lancy* are celebrated in the annals of France, as the means by which Catharine de Medicis, wife of Henry II., was cured of her sterility. She made use of them, agreeably to the advice of her physician, Fernel, as drink, and by way of bath and douche. She had after this visit, in due time and series, her three children, Henry, Charles, and Francis, all three kings of France in succession. In gratitude to her physician, she presented him, on the birth of each child, ten thousand crowns—a considerable sum in those days. The efficacy of these waters is chiefly due to their elevated temperature.

Carlsbad Waters.—Bohemia abounds in minerals and mineral springs, and among the latter few have obtained such celebrity or are so much resorted to as those of Carlsbad. “This name, as well as that of the Caroline waters, is attributed to their having been resorted to and first brought into considerable notice by the Emperor Charles IV., in 1370, which shows

that these baths have long been held in estimation. Carlsbad contains several springs, all of which resemble each other in height of temperature and in chemical properties: the most important of these is the one which arises with great vehemence, and in a most copious stream, intolerably hot to the touch, and boiling up with violence, and on this account it has been denominated the Sprudel or furious spring.”

The temperature of this fountain, as it first issues forth, is as high as 165°, and keeps invariably at the same point. On account of the heat and quantity of water there is always a thick vapour seen to hover about the mouth of the spring, and from the density of the steam and the tardiness with which it disperses, the country people foretell the approach of rain.

An English wine pint of this water contains, according to Bergmann,

Carbonate of lime,	4.15 grains.
Sulphate of soda,	41.51 “
Muriate of soda,	5.33 “
Crystallized carbonate of soda,	11.76 “

Total, 62.95, along with
a small quantity of iron.

The gaseous contents have not been measured with any degree of accuracy; but probably a considerable quantity of carbonic acid would be found.

Klaproth's analysis gives less saline ingredients.

Besides the Sprudel fountain, there is another of considerable importance, and differing somewhat in composition, which, from the circumstance of its turning a mill, has been called Muhlbrunn, and appears to have been particularly brought into notice by Hoffmann. The temperature of the latter is only

114°, and it differs from the former in containing more carbonic acid, more soda, and less calcareous earth.

Sartori makes the temperature of this fountain 145°.

The immediate effect of the Caroline water, taken internally, is increasing the discharge from the bowels, and in larger doses, acting as a speedy and active purgative. The Muhlbrunn is more certain than the other in its operation. If the stomach be foul, vomiting is not unfrequent, after first drinking the water. Determination to the head, vertigo, and drowsiness, and occasionally swelling of the feet and other parts of the body, follow its use in some persons; and in irritable habits a cutaneous eruption is at first brought on, which after a while disappears by a longer use of the water.

“ In common with the other purgative chalybeates, it is found to be eminently serviceable in dyspepsia and other derangements of the healthy action of the stomach; in obstructions of the abdominal viscera not connected with great organic disease; and in defect or depravation of the biliary secretion; and here probably the soda will contribute much to the general efficacy. In those disorders of the kidneys and bladder that are attended with a discharge of sabulous concretions and a tendency to calculus, the Carlsbad waters had long been celebrated; and their operation, like that of the other alkaline waters, is that of increasing the flow of urine and giving an easier passage to the extraneous matter, which when detained is productive of so much mischief. Owing to the activity of the chalybeate ingredient, and at the same time the power which this mineral spring possesses of giving a sensible increase to all the secretions, without inducing debility, it is highly esteemed for restor-

ing a healthy state to the uterine system in females, and thereby removing sterility. In short, we may ascribe to this thermal water the virtue that reside in several of the mineral springs which we have already noticed; and its high temperature and abundant quantity render it admirably adapted for warm bathing at any degree of heat.

“The same precautions against its internal use in plethoric and irritable habits, in those who are subject to hemoptysis, or liable to apoplexy, require to be observed here, as with any of the other active thermal waters; and as its power of producing serious mischief when misapplied cannot be doubted, its efficacy in removing various diseases and relieving many distressing symptoms is equally established by long experience.”—*(Saunders.)*

The *Töeplitz* waters, though less efficacious than the foregoing, enjoy considerable reputation, and are highly commended by Hufeland. According to him, they make the lame walk, the deaf hear, and the dumb to speak: they are, in fact, very serviceable in gouty and rheumatic affections.

Ambrozzi's analysis makes them contain small portions of sulphate and muriate of soda, carbonate of lime, oxide of iron, silex, carbonic acid, and resinous matter. Temperature 117° F.

The thermal waters of the *St Julian* springs contain a large proportion of saline ingredients. A hundred pounds of the water of the chief one, or of Pozzetta, have the following substances in solution.

Carbonic acid,	187 grains,
Sulphate of soda,	203 “
Muriate of soda,	265 “

Sulphate of lime,	269 grains,
Sulphate of magnesia,	325 “
Muriate of magnesia,	189 “
Carbonate of lime,	281 “
Carbonate of magnesia,	87 “
Alumina,	46 “
Silica,	12 “

1874

The arrangements for bathing are of the most convenient kind ; which, joined to the high temperature and rich saline impregnation of the waters, and their easy access, render the St Julian springs a place of resort to a large company of Italians and strangers annually.

The communication with Pisa, four miles distant, is by a fine road and a canal. From Pisa to Lucca it is but five leagues, and to Florence nine; the roads to both cities passing through a rich and picturesque country.

The thermal saline springs, called the *Warm Springs* of North Carolina, deserve a notice in this place. The water is limpid, and gives out freely a gas, which the late Dr Smith of Columbia ascertained to be nitrogen. On the same authority, we learn, that the saline ingredients in three quarts of water are, muriates of lime and magnesia 4 grains, sulphate of magnesia 6 grains, sulphate of lime 14½ grains. Persons visiting the waters often drink three or four quarts in a day. It can be regarded as little else than a diluent; though, after several day's drinking, it is said to produce a cathartic effect. Chronic rheumatism and paralysis are among the diseases cured by drinking the water and bathing in it.

The most noted cold saline mineral waters in Europe are those of Epsom and Cheltenham, in England; Seidlitz and Seydchutz, in Bohemia. Sometimes the Pyrmont waters are classed under this head—at others, under that of chalybeates. It is in this latter point of view that I have spoken of them.

The *Cheltenham* springs are among the most celebrated in England. The waters are thought to be peculiarly adapted to all those persons, and they constitute a numerous class, whose digestion has been impaired, and their hepatic secretions deficient and irregular, by living in hot climates, too free a course of living, corroding cares, and intense occupation in the cabinet or at the desk. Hence, the jaundiced skin and eye, the tumid liver, the crabbed temper, are ailments which the invalid hopes to have removed by a course of these waters. There are many so uncharitable as to think Cheltenham ought to be the resort alone of the atrabilious, jaundiced and dyspeptic nabobs, travellers, worn out statesmen, and merchants who have lost their health in hunting after fortune; and when youth and beauty, the winning smile and blooming cheek are seen, it is unfairly supposed that they are marketable articles, the fair owners of which are willing to take the names of the jaundiced visitors in consideration of the bonus presented by these latter, in the shape of rupees, sovereigns or dollars. All this may be so, but I am not called upon to vouch for its accuracy. It is, after all, a matter of mere speculative curiosity to us on this side of the Atlantic. Our young ladies, sweet and gentle bodies, strangers to guile, never think of making any of our celebrated mineral springs, Saratoga for example, a scene for the display of their

charms, to catch Mr Testy the rich planter, or Mr Grumble the millionaire merchant.

In taking a general review of their composition, all the waters at Cheltenham, for there are six different springs, Dr Scudamore “finds that there are three kinds—all saline, aperient and alterative; some containing a very feeble sulphuretted impregnation; others a small portion of oxide of iron held in solution by carbonic acid. The aperient agent is sulphate of soda—the alterative, the muriates of lime and magnesia. It is the practice to increase the purgative power of (the spring) Thompson’s, No. 4, by the addition of a solution of the salts obtained by evaporation of the water.”*

A wine gallon of the Cheltenham water contains 480 grains of the sulphate of soda, 40 grains of the muriate of lime, with some muriate and carbonate of magnesia, oxide of iron, carbonic acid, and nitrogen.—One of the springs has an impregnation of sulphuretted hydrogen.

The salutary effects of the Cheltenham waters are said by Dr Scudamore to consist in the fact, “that an invalid can pursue a continued daily course, such as produces a regular and considerable action on the bowels, without suffering that debility of the constitution and impaired appetite, which are apt to occur from a similar course of saline aperients at home.”

We are very properly told that a course of Cheltenham waters should not be entered upon without medical advice.

* A Chemical and Medical Report of the Properties of the Mineral Waters of Buxton, Matlock, Tunbridge Wells, Harrowgate, Bath, Cheltenham, Leamington, Malvern, and the Isle of Wight. By Charles Scudamore, M.D. Pp. 265. 8vo. London, 1820.

“As a general rule, a mercurial purgative should precede the use of the water. It is an important fact, that if much confinement of the bowels have prevailed, and more especially if there be decided biliary obstruction, the water, instead of becoming the ready remedy which is expected, may prove a source of evil in the way I shall state. It may act upon the exhalent vessels of the alimentary canal, so as to produce only fluid discharge, and actually leave behind the more solid and obstructing matter. The same observation applies in a great degree to the use of the water in progress. It is, I know, the medical practice at Cheltenham, and very judiciously, to conjoin the use of a purgative alterative pill with the water. This will of course be more or less active in its composition, according to the constitution of the patient and the nature of the case.”

In the diseases to which these waters are applicable, the disordered condition of the digestive organs, produced by a residence in tropical and other fervid climes, ranks foremost.

“It is an encouraging consideration, for those who labour under disordered functions of the liver, together with debility of the constitution, that the action of the Cheltenham water on the bowels, from day to day, is not attended with the weakening effect which is liable to happen from ordinary medicine; and as the individual who has resided in a tropical climate, most usually has undermined the real powers of his constitution, this is a point of great moment.”

A very useful auxiliary to a course of these waters, both in the cases just referred to and in gout, would be the warm bath. It is in nearly similar diseases that the waters of the White Sulphur Springs are

found so serviceable: and after, or alternating with them, the invalid has the rare advantage of enjoying the fine natural warm baths of the Hot and Warm Springs.

Epsom water is now scarcely at all employed in medicine. It merits notice as being one of the first of the saline purgative springs that was brought into use, and because the salt to which it owes this property was long prepared from the water, and known all over Europe as a peculiar saline substance called Epsom salt.

This salt, the sulphate of magnesia, is now prepared as an article of commerce from sea water which has been boiled down to procure from it its muriate of soda.

Of the *Seidlitz* or *Sedlitz water* the notice must be more copious. The strongest of the simple saline springs is that of the village of Seidlitz, in Bohemia, nine miles from Prague. It was long neglected by the rustic inhabitants, on account of the salt bitterness of its water, that rendered it unfit for most domestic purposes, until it was brought into notice by the celebrated Hoffmann, about the year 1721, as a medicine of considerable efficacy.

Five pints of Sedlitz water contain the following substances:

Resinous matter,	3 $\frac{3}{4}$ grains,
Carbonate of magnesia,	6 $\frac{1}{4}$ “
Sulphate of magnesia,	1410 “
Sulphate of soda,	341 $\frac{1}{2}$ “
Sulphate of lime,	26 “
Carbonate of Lime,	19 “
Carbonic acid,	6 “

Hoffmann pointed out the peculiar advantages of the Sedlitz water over common purgatives, and even the milder aperients, in freely evacuating the stomach and bowels without pain and griping, reduction of strength, impairing of the appetite, or weakening the digestion. This distinguished writer and professor then goes on to enumerate the diseases to which it is particularly applicable. When the stomach is distressed by collections of mucus, and other humours causing nausea, eructation, and the like, this water evacuates it, and restores the appetite and healthy digestion.

In hypochondriasis, with its concomitants, of difficult breathing, pain in the back and head, occasional vertigo, coldness of the extremities and habitual costiveness, this water aids in clearing the alimentary canal of its accumulated contents, and in restoring its natural contractile powers. In this respect, it contrasts advantageously with the aloetic and drastic purgatives, so commonly administered in this complaint; and hence persons, who for a length of time have had no evacuation from the bowels, except such as has been procured by the stronger purgatives, have found, by using for a while the water of the Sedlitz spring, so great a change that the intestines have returned gradually to their healthy and natural functions.

As serving to throw light on the treatment of various chronic maladies, I subjoin the following observations of Saunders on the Sedlitz waters. He repeats mainly after Hoffmann, whose partiality has probably carried him too far in his eulogies.

“Numerous trials have shown the efficacy of this saline water in that cachexy of females attended with a suppression of the menstrual discharge, whereby are

produced a general languor, difficult respiration, febrile heat and irritation, wasting of the body, and loss of appetite. Also, when women have arrived at that time of life when this periodical evacuation begins to cease, and is succeeded by a number of anomalous disorders, such as prostration of appetite, and flatulent pains, irregular flushings, pains in the back, and swelling of the feet, a course of Seidlitz water restores the wavering appetite, and disperses the tumours and other morbid symptoms.

“Men of from forty to fifty years of age, who have led a very sedentary life, and have been accustomed to intense thought and profound meditation, become frequently affected with œdematous tumours in the extremities, a want of due action in the stomach, eructations after taking food, and a generally impaired state of health; all of which are for the most part very certainly removed by a liberal use of this water.

“Persons of a plethoric habit of body, who from some obstruction to the free circulation of blood through the abdominal viscera, have acquired a strong disposition to hemorrhoidal affections, become thereby often exposed to very serious evils. For if the obstructed blood be determined to the stomach and bowels, there arise severe pains over the whole abdominal region, extending round to the back; if to the breast and head, it occasions a sense of weight and oppression about the precordia, nausea, difficult respiration, a dry cough, heaviness of the head, and anxiety of mind; and always attended with either an obstinately costive state of body, or at least too sparing an evacuation from the bowels. These disorders are in general treated with aloetics, combined with the warm resins or balsams, with a view of stimulat-

ing the intestines and determining the blood to the vessels of the rectum; and in many cases, especially in females, and in those of a phlegmatic temperament, much advantage is derived from these remedies. But, at the same time, an indiscriminate and frequent use of these medicines in all habits and in every state of body is often productive of serious consequences. For when the body is in a highly irritable and plethoric state; and especially where there is an hereditary tendency to hemorrhoidal complaints, a violent determination to the lower intestines and os sacrum often occasions painful protrusions of the rectum, which, if neglected, will frequently degenerate into fistula. To such persons a saline water, like that of Sedlitz, is much more safely applied, especially if accompanied with bloodletting when requisite, and a general anti-phlogistic plan of cure.”

“The dose of Seidlitz water sufficient to produce the desired effect varies according to the age and habit of the patient. To some persons about five or six tea-cups full of the water prove sufficiently aperient, and few require so much as two pints. If the salt alone be used, it may be dissolved either in pure water or that of Spa, in the proportion of half an ounce to a pint of the solvent, and thus a purgative chalybeate will be formed. The Sedlitz water is also an active medicine when employed as a clyster, and its operation may be strengthened by an additional quantity of the salt.

“A single dose of half a pint of this water will contain, according to Bergmann’s analysis, about 97 grains of foreign contents, of which 90 grains, or a drachm and a half, is sulphate of magnesia, a quantity amply sufficient to give very strong sensible proper-

ties. It may be observed, that Hoffmann, like all the authors who are not quite of our own times, recommends a much larger bulk of water for a single dose than we are now in the habit of employing. Few patients would now be willing to take at once a pint or quart of any water, and the effect on the bowels will certainly be as well secured, if it be taken in a smaller quantity, and at two or three draughts, with a short interval interposed between each.

“Hoffmann judiciously recommends, during a long course of this water, that its use should now and then be interrupted for a day or two. It is likewise a great advantage attending these natural saline purgatives, that little or no other medicine is required whilst these are used: but great attention is always to be paid to diet, exercise, and the state of the mind, so that the patient should always avoid heavy indigestible food, should be kept free from anxiety and care, and should make it a constant part of his daily occupation to strengthen his body by moderate and prudent exercise.”

The Seidlitz water is generally converted into a tepid temperature before being drunk. It is an admirable remedy in the worms of infants.

The great facility with which an artificial Seidlitz water may be prepared, places it in the power of every physician to test in practice the correctness of Hoffmann's praises of the natural water. I venture nothing in asserting, that the course of medication, pointed out above, might very advantageously take the place of the prodigal use of mercurials and antimonials, and resinous drastic purgatives.

The following is the formula for preparing the fac-

titious water of Seidlitz and Seydchutz, agreeably to the method adopted by Tryaire and Jurine.

Pure water,	20 ounces,
Carbonic acid,	3 times this volume,
Sulphate of magnesia,	144 grains,
Muriate of magnesia,	18 “

The Seydchutz spring is so near that of Seidlitz, that it was thought by Hoffmann to have the same origin. The water of the former contains, however, more saline substances than the latter, but less carbonic acid.

The general reader ought to be apprised, that the mixtures sold in the shops, under the title of Seidlitz powders, have no resemblance in composition to the real salts of that name. The powders prepared by the apothecary are, one set of tartaric acid, the other of the bi-carbonate of soda, which, when added together in solution in water, form a tartrate of soda with a disengagement of carbonic acid. The *patent Seidlitz powders*, as they are called, consist of two different powders: the one contained in the white paper consists of two drachms of *tartarised soda* and two scruples of *carbonate of soda*, that in the blue paper of thirty-five grains of *tartaric acid*.

Of the saline mineral springs of the United States, those of *Saratoga* are by far the most celebrated. The composition of these waters is such that they might, if we merely had regard to the abundance of carbonic acid which they contain, be placed with the acidulous class; or, were we influenced by the fact of their holding iron in solution, we should consider them as chalybeates. In placing them under the saline head, I have been more influenced by the fact of their free action on the bowels, than by the

nature of the saline ingredients, in none of which, however, do we recognise a regular purging salt, such as the sulphate of soda found in the Cheltenham waters, or the sulphate of magnesia found in those of Seidlitz, or in smaller quantities in those of Harrogate, or of Harodsburgh, Kentucky, or of the White Sulphur Springs, Virginia.

The most celebrated of the numerous springs of Saratoga, is the *Congress* spring. For the various details connected with an analysis of this water, I must refer the reader to the work of Dr Steel, already mentioned. One gallon or 231 cubic inches of the water of the Congress Spring contains, according to this gentleman, the following substances:

Chloride of sodium (sea salt),	385.0	grains,
Hydriodate of soda,	3.5	“
Bi-carbonate of soda,	8.982	“
Bi-carbonate of magnesia,	95.788	“
Carbonate of iron,	5.075	“
Silex,	1.5	“
Hydro-bromate of potash, a trace,		

597.943

Carbonic acid gas,	311	cubic inches,
Atmospheric air,	7	“

Gaseous contents, 318 cubic inches.

The analysis made some years since by Dr Meade differs from the foregoing, chiefly in its exhibiting the presence of the muriates of lime and magnesia, and in not taking cognizance of the hydriodate of soda.

Of the medical effects of the Congress water and the precautions to be adopted by those drinking it, Dr Steel speaks in the following sensible strain.

“The medicinal qualities of this spring have acquired for it a reputation abroad to which no other fountain in the United States has yet attained; and it is highly probable, from the active ingredients which enter into its composition, that it will continue to retain an ascendancy which has been so liberally and so justly conferred upon it. Such are its rare and peculiar qualities, that while it operates as an active and efficient medicine, it possesses the properties of an agreeable and delightful beverage; and it is daily sought after and drunk by all classes of people, for no purpose than simply to gratify the palate or to allay the thirst. And although in this way it is frequently taken in sufficient quantities to produce its most active effects upon the bowels, it is seldom, if ever, known to be attended with any unpleasant consequences, but is always considered by those who thus use it as invigorating and healthy.

“From one to three pints of the water, taken in the morning before eating, usually operates freely as a cathartic, and at the same time has a most powerful effect in increasing the ordinary secretions of the kidneys; but its operation, like that of all other medicines, is much influenced by the condition of the stomach and bowels at the time of receiving it, as well as by the state of the system generally. It therefore frequently happens that a much larger quantity seems to be required, in order to produce its characteristic effect upon the bowels; and invalids have been known to drink twenty, thirty, and even forty tumblers-full of it in a morning without much apparent inconvenience. It requires, however, but a slight acquaintance with the properties of the water, to satisfy any rational mind that such a procedure is highly im-

proper, and even dangerous. Quantities so immoderate can never be useful to persons who are either infirm or in health; and there are numerous instances in which they have produced consequences of a very alarming character.

“It is a cathartic, possessing evidently interesting and important qualities, and as such it is recommended and used in all those chronic diseases where cathartics and gentle aperients are indicated; and such are its peculiar effects, when judiciously administered, that it may be persevered in for almost any length of time, and a daily increased evacuation from the bowels produced without debilitating the alimentary canal, or in any way impairing the digestive powers of the stomach; but, on the contrary, the spirits, appetite and general health will be improved and invigorated.

“It is obvious that the mode and management of taking the water must depend altogether upon the nature of the case for which it is administered, and the consequent kind of effect desired to be produced from it. As it is directed simply for its cathartic or aperient properties, it is in almost all cases important that its operation should be speedily and promptly effected. The quantity required to produce the effect desired must be varied with different persons; and even the same persons at different times, and under different circumstances, will require different portions. It is therefore impossible to fix upon any certain quantity that will apply in all cases: much must be left to the judgment and discretion of the invalid himself. In ordinary cases, *three* pints taken on an empty stomach, an hour or two before eating, and followed by a proper share of exercise, will be found

amply sufficient for all the purposes required. Should this quantity, however, be found inadequate to the effect, it will be better to relinquish the use of it altogether for the day, than to attempt to produce a different result by additional potations of the water. On the following morning the quantity may be increased to another pint; and should there be fears of the inadequacy of this quantity from extreme constipation of the bowels or other causes, a tea-spoonful or two of Epsom salts may be added to the first tumbler. This will insure a competent operation, and the invalid will soon be enabled by his experience to determine the quantity which his case requires.

“In cases where the stomach and bowels have been for a long time subjected to the effect of morbid excitement, and the whole system enervated by the deranged functions of the assimilating organs, the quantity here recommended will be altogether inadmissible. The effects of distention, and the abstraction of temperature consequent upon admitting so large a quantity of cold water into a stomach thus enfeebled, can scarcely fail of being highly detrimental. Reliance, therefore, must not be placed upon the water, in these cases, to move the bowels; it can only be used as an auxiliary to that purpose, and should always be associated with some other cathartic medicine suited to the particular case. A little magnesia, magnesia and rhubarb, or a laxative pill may be taken over night, and a tea-spoon or two full of the sulphate of potass or magnesia, combined with a glass or two of the water in the morning, is usually advised.

“The proper time for drinking the water of this spring is unquestionably in the morning—an hour or

two before breakfast; indeed, as a general rule, it should not be meddled with at any other period of the day; and it would be much better for those whose complaints render them fit subjects for its administration, if the fountain should be locked up and no one suffered to approach it after the hour of nine or ten in the morning.

“Nothing can be more absurd than the ridiculous practice of taking large potations of this water at all hours of the day, and particularly immediately after meals. The impropriety of evacuating the contents of the stomach and bowels before the assimilating powers of digestion have accomplished their labours, must be obvious to every one. It should, therefore, only be taken in the morning before eating, when its operation will be exerted in removing the fetid remnants of an impaired digestion, and evacuating the sordid and irritating accumulations induced by an enfeebled state of the intestinal canal. When this effect is produced, the water has accomplished all that can reasonably be expected from its use; and the digestive organs being freed from their offensive feculent burthen, are left in a condition to act with better effect on the subsequent aliment which may be presented to them.

“The invalid, whose health and strength will admit of it, should always rise as early as six o’clock at farthest, and when the weather is suitable, repair to the spring, and take the water at the fountain head. The exercise necessarily connected with this mode of drinking the water, together with the invigorating effect of a wholesome atmosphere and amusing company, add much to its efficacy as a medicine.

“The manner of drinking the water at the foun-

tain requires but little attention. It is dipped from the spring in half-pint tumblers, one of which constitutes a very suitable quantity for a single draught. As it is intended to move the bowels, it is necessary that these draughts should be repeated in as quick succession as the condition of the stomach will permit. As soon as the sense of fullness occasioned by the first tumbler has passed off, another may be taken, and so on until the quantity necessary to move the bowels has all been drunk. This is usually accomplished in the course of half an hour, without materially disturbing the tranquillity of the stomach, and its effect is seldom delayed beyond the limits of an hour. Should this be the case, however, and no operation effected before the period of breakfast arrives, a cup of coffee or tea, connected with a light repast and suitable exercise, will seldom fail of producing a speedy termination to the delay.

“The low temperature of the water, in some cases, forms a serious objection to its being drunk to the extent that is required. This may be remedied in some measure by securing the water in well corked bottles, and suffering them to stand in the room overnight. In this situation the temperature of the water is elevated to that of the atmosphere of the room, and may be drunk with less danger of producing chills. When these do succeed, after the above precaution, recourse is sometimes had to plunging the bottle into warm water a few times before removing the cork. This will unquestionably remedy the evil; but the water will be more apt to produce nausea and other disturbances of the stomach, not less injurious to the good effect to be expected from its use than that of chills.

“It should always be remembered, that by elevating the temperature of the water to any extent, the escape of its carbonic acid becomes abundant, and it is thereby deprived of one of its most important ingredients, the loss of which renders it extremely insipid, and its effects are by no means so pleasant or useful.”

A useful caution is given to those who wish to secure the water for transportation and distant use.

“The practice of putting the water into wooden casks, earthen jugs, or tin canisters, for the purpose of transportation, as is sometimes done, is but little better than placing it in open vessels. It soon loses its vivifying gas, and becomes extremely insipid and offensive. It can only be properly secured and preserved in strong glass bottles, well corked, and the corks fastened by wiring.”

The result of the attempts made to obtain the salts of this water by evaporation, is thus described by Dr Steel.

“From the known and acknowledged efficacy of the water as a medicine, it was inferred that its saline deposits might answer a valuable purpose in cases where the water could not be procured, and at one time considerable quantities were manufactured for sale, by evaporation; but the imperfect solubility of these salts renders them not only disagreeable, but frequently irritating and offensive to the stomach, and the present proprietors of the spring have very properly prohibited their further manufacture.”

The following is a useful hint to certain manufacturers, to be less eager in forcing their imitations on the public; and it conveys a caution to the public to be

less credulous in believing the boastful promises of these persons.

“Influenced by the popular character of the water, individuals have been induced to attempt an artificial composition of it, and, under the imposing names of ‘Congress Water’ and ‘Saratoga Powders,’ articles have been presented to the public, which, although they possess aperient qualities, in reality bear no resemblance, either in their effects or their properties, to the mineral water, the name of which they have assumed. They may move the bowels, it is true, but in this they do not appear to possess any superiority over the common Seidlitz powder, which is now in every body’s hands, and which, as a laxative medicine, in all ordinary cases, is undoubtedly to be preferred.”

The water of the *Columbian* spring resembles that of the Congress one in its saline ingredients, but it contains these in less proportion than the latter; except in the instances of the bi-carbonate of soda and the carbonate of iron.

The Columbian water “seldom operates as a cathartic, unless when taken in large quantities, or used by persons whose stomachs are excessively irritable. Its most obvious effects, when taken in proper doses, are diuretic, at the same time operating on the secretions and excretions generally. It likewise manifests the powers of a mild and pleasant stimulant, and from the large proportion of iron which enters into its composition, it occupies a distinguished rank among the *tonic* waters which the place affords.”*

Southwest, distant about fifty rods from the Colum-

* Steel. Op. cit. p. 129, 130.

bian, is the Washington Spring, which closely resembles the former except in being rather less chalybeate. "A large and commodious bath house has been erected close to the spring, called the Washington Bath, which is supplied with mineral water from this spring. It has likewise the advantage of the very pure stream of fresh water which passes immediately under the building, for the purpose of ordinary bathing."*

The water of the Hamilton Spring has, in the gallon, the following ingredients:

Chloride of sodium,	297.3 grains,
Hydriodate of soda,	3.0 "
Bi-carbonate of soda,	27.036 "
Bi-carbonate of magnesia,	35.2 "
Carbonate of lime,	92.4 "
Carbonate of iron,	5.39 "
Hydro-bromate of potash, a trace	

460.326

Carbonic acid gas,	316
Atmospheric air,	4

Gaseous contents, 320 inches in a gallon.

"This water," says Dr Steel, "ranks first among the springs as a diuretic, and it has long been celebrated for its good effects in gravelly and calculous affections. It is second only to the Congress in its saline impregnation, and is frequently used as a substitute for the water of the latter spring in all those cases where the irritable state of the stomach renders the more drastic effects of that water inadmissible.

"In scrofula, and indeed all other indolent swell-

* Steel, p. 132.

ings of the glands, the water of this spring, together with that of the Columbian, will unquestionably take the preference; for although they do not contain quite so large a proportion of the iodine as is found in the Congress water, they contain a much less quantity of other active saline ingredients, which render them less liable to affect the bowels, and their effects upon the system generally are thereby rendered more certain.

“It is, without doubt, owing to the iodine which these waters contain, that they have become so famous in the cure of strumous affections; and the water which contains the greatest abundance of this article, and is least encumbered with those substances that may tend to retard or prevent its effects upon the system, should unquestionably be directed as the most applicable in these complaints.”

The water of the *Flat Rock* spring in appearance and taste very much resembles that of the Columbian, and is used in all cases in which the latter is recommended.

The *High Rock* spring, once in great vogue, has been comparatively little visited since the discovery of the Congress spring, and the extensive improvements that have been made in that vicinity.

The *President* spring is thought to have a common origin with the High Rock one.

The water of the *Red* spring has a saline impregnation much less than any of the other springs, and its gaseous contents are still more deficient, when compared with those of the other fountains.

The *Ten* springs discovered in 1814 have obtained but little celebrity.

The water of *Ellis's* spring “affords 316 grains of

solid contents to a gallon, which contents consist of marine salt, carbonate of soda, lime, magnesia, and iron; the last of which it affords in as great abundance as any of the mineral waters either at Saratoga or Ballston. It is indeed a very excellent chalybeate water; and, as such, is in high estimation, although, in consequence of its remote situation, it is but seldom resorted to."

The morbid states of the animal economy in which recourse may be had to the Saratoga and Ballston waters, are clearly and distinctly described by Dr Steel. Among other pertinent observations on this subject we meet with the following:

"In all those affections usually termed *bilious*, if the attack be recent and unattended by any serious organic affection, it is most usually removed in the course of a few days by a free use of the Congress water alone; but in those cases where the functions of the stomach and bowels have become impaired from the long continuance of the disease, attended with anasarca swellings of the extremities, &c. although the waters of this fountain may be resorted to with nearly the same assurance of obtaining relief, nevertheless more caution is indispensably necessary in its administration; for should a great quantity of the water be drunk without having the proper effect by the bowels and kidneys, it is never beneficial, but, on the contrary, frequently increases the most alarming symptoms of the complaint.

"In cases of this description, I have long been in the habit of recommending the addition of some mild cathartic medicine; and for this purpose a few grains of calomel, or the blue pill, are directed to be taken over night, followed in the morning by a sufficient

quantity of the water to move the bowels briskly two or three times with the happiest effect. A few doses of this description usually put the bowels in a situation to be more easily wrought upon by the water, and the patient becomes convinced of its efficacy in his disease from a few days proper application.

“ In the more advanced stages of bilious affections, where the organization of the liver and other viscera has materially suffered, and the disposition to general *hydrops*, indicated by the enlargement of the extremities, fullness of the abdomen, &c. the waters are all of them manifestly injurious, and are not to be admitted, even as an auxiliary remedy.

“ In all those functional affections of the organs employed in the process of digestion, constituting what is usually termed *dyspepsia*, the waters have long maintained a high and deserved reputation. The Congress water is principally relied on for the cure of these affections. This should be taken in the morning, an hour or two before breakfast, in sufficient quantity to move the bowels freely once or twice. In ordinary cases, four or five tumblers-full are sufficient for the purpose; and in weak irritable habits, half the quantity, or a single tumbler-full in some cases, is amply sufficient to answer the purpose.

“ In those cases where the bowels are attended with an habitual constipation, the large quantity of water required to move them often produces unpleasant distention of the stomach and bowels, and by producing cold chills and nausea, frequently defeats the general intention of its application. This, in some instances, may be remedied by simply elevating the temperature of the water by keeping it for some hours in well stopped bottles in a warm room. When this fails, re-

course may be had to some suitable laxative, which should be taken over night on going to bed; and a much less quantity of the water in the morning will answer the wishes of the patient, without subjecting him to any very great inconvenience. Or, if circumstances require a still greater effect, a little Epsom, or some other laxative salt, may be added to the first glass of the water. In this way the difficulty will soon be overcome, when a much less quantity of the water will be found to answer the purpose.

“But the Congress water is not alone to be depended on for the removal of these affections: when the stomach and bowels have been properly cleansed by the mild and innocent purgative properties of this water, for which purpose it is to be drunk only in the morning, the remainder of the day should be devoted to the moderate and discreet use of some of the more pure chalybeate waters: as that of the *Flat Rock, Columbian, High Rock, Ellis’s spring, or Ballston Spa.*”

The rules as to the quantity of water to be drunk are well set forth by Dr Steel when he says,

“The quantity of water from either of these fountains, to be used daily, must necessarily depend in a great measure on the state of the disease and the condition of the stomach. It is therefore best to commence their use in small quantities at a time, and at distant and regular intervals; gradually increasing the quantity and frequency of the draught, as may be most agreeable to the stomach, and least unpleasant to the feelings. In this way the quantity may be increased to from one to two quarts; and it is questionable whether a much larger quantity may be drunk with any additional advantage.”

The remarks on the use of tonics, which follow,

merit the attention of both physicians and invalids. The practice of medicine would be more generally successful if we were to expunge entirely the class of tonics from the *Materia Medica*.

“The use of chalybeate medicines in the cure of the deranged state of the digestive organs has seldom been directed, except in conjunction with laxatives of some kind; and it is now a subject of speculation with some of our best and well informed practitioners, whether the cure might not be as expeditiously effected by the judicious administration of laxatives alone. It is certain that three-fourths of the cases usually termed *dyspeptic*, which congregate at these springs during the drinking season, owe their origin to the ill-timed administration of chalybeates and other *tonic* remedies, prescribed for the purpose of bracing up what was supposed to be a *debilitated stomach*; or, in more familiar terms, ‘*to wind up a run down constitution.*’

“‘From long and unbiased observation,’ says the venerable Dr Armstrong, ‘I am fully convinced that most of the medicines called *tonics* are either useless or pernicious; and if these were erased from the pharmacopœias, it would be a real benefit to the profession and mankind; for they only serve to mislead the former, and to tantalize or injure the latter. Tonic medicines generally oppress the digestive functions, or operate as direct stimulants, and in either case they are improper in convalescence; for by the first they may destroy the natural appetite, and by the last they may lead to chronic inflammations. So far from such drugs being appropriate to a stage of convalescence from acute disease, mild laxatives are most frequently requisite to preserve a right balance between the in-

gesta and the egesta; and the practitioner who substitutes the former will find that his patients will pass better through convalescence, and be afterwards far less subject to consecutive attacks of inflammation.' These remarks are so much in accordance with my own experience and observation, that I could not forego the opportunity of transcribing them here."

In *calculous* and *nephritic* complaints, drinking these waters, aided by the warm bath, is found to be of very great benefit. It is to be regretted that Dr Steel should express himself in the customary indefinite manner, when directing this latter remedy at a "temperature which should be from 100° to 110°;" and still more must we be surprised at the length of time—one or two hours—which he deems proper for continuing the immersion. Very few can tolerate a bath of 110 degrees, and when they do, they will most assuredly call it, not warm, but very hot; and they will desire to escape from it long before the expiration of an hour.

In *chronic rheumatism*, *cutaneous eruptions*, *scrofula*, and *phagedenic, ill-conditioned ulcers* of the extremities, the judicious use of these waters, and of bathing, is attended with manifest relief and often a complete cure. The efficacy of these waters in scrofula and strumous swelling is explained by their containing iodine, although unquestionably numerous cases of these maladies have been cured annually, by drinking mineral waters in which none of this substance is found.

Bromine is another substance that has lately been discovered in the water of the Saratoga springs, and from its well known activity in scrofula, may contribute to the cures of this disease.

Dr Steel tells us that these waters are injurious in

dropsy, arising from organic derangement of long continuance; "but in recent cases, arising simply from a deficient action of the absorbent vessels, the water has a singular effect in removing it. It should be drunk in the morning freely so as to produce a copious discharge from the bowels; and through the day taken in such quantities as to keep up a pretty constant discharge of urine."

In *paralysis*, the purgative properties of the Congress water are deemed beneficial.

"In *chlorosis*, and a variety of other complaints peculiar to the female sex, the waters maintain a high and deserved reputation."

"In *phthisis* and indeed all other pulmonary affections arising from primary disease of the lungs, the waters are evidently injurious, and manifestly tend to increase the virulence of the disease. Their use, therefore, in these complaints, as well as in all acute or inflammatory diseases, should be strictly prohibited."

Dr Steel concludes his work by a recommendation, the propriety and humanity of which must be universally admitted. It is, to erect a small hospital at the springs, for the reception and suitable treatment of the sick poor, who annually come on to drink the waters, but who have no means of paying for lodging, nursing and regular medical attendance. Either the general or state governments should make appropriations for the erection and suitable endowment of hospitals at the chief mineral springs of the country. Such beneficent institutions are general in all parts of Europe, in which the waters of a place have acquired undoubted reputation in the cure of chronic diseases. Surely we on this side of the Atlantic ought not to be behind any other people in works of practical philanthropy.

It would seem from Dr Meade's analysis of a mineral spring near Albany, which he calls the *Albany water*, that its mineral ingredients are as numerous as those in the Saratoga waters, and the sum total larger than in the latter. A wine pint contains,

Muriate of soda,	59 grains,
Carbonate of soda,	5 “
Carbonate of lime,	4 “
Carbonate of magnesia,	1½ “
Carbonate of iron,	1 grain,
Muriate of lime,	½ “

71

Carbonic acid gas, 26 inches.

The *Harodsburgh* or *Grenville* springs of Kentucky are much resorted to. The town of Harodsburgh is about thirty miles from Lexington, on the great southern road to Nashville. Its situation is pleasant, the country around being agreeably broken into hill and dale, and for the most part clear, except at intervals where clumps of trees are planted.

The springs are half a mile from the town. On one side of an extensive green, shaded with locust trees, is the principal house or tavern; on the other, is a row of cottages or cabins for the accommodation, perhaps storage would be a better word, of families, when visiting the springs.

The Harodsburgh springs are resorted to by many persons from the state of Mississippi and adjoining country, who find additional inducement to visit this spot on account of its proximity to Lexington, where they can spend a portion of their time, in enjoying the society of the hospitable and intelligent citizens of that town. The visitors from the latter place are also said to resort to the springs in considerable num-

bers in the months of July and August. During the present season the concourse of persons is very considerable.

The chief spring is in a hollow in the garden; the water flows in small quantity; it holds in solution the sulphates of magnesia and soda, carbonates of magnesia and iron, and sulphate of lime. In taste it resembles a weak solution of Epsom salts, with a slight chalybeate impregnation.

To those whose bodies have been enfeebled, and their digestion impaired, by the exhausting heats and impure air of the low grounds of the southern country, drinking the water of these springs will afford great relief. As an alterative, its judicious use, alternating with some mild laxatives, will be of manifest utility in engorgements and obstructions, as well of the abdominal viscera, as of the lungs—especially where the scrofulous diathesis prevails.

Any sketch of the history of saline mineral waters would be incomplete without a notice of *Sea Water*. It much exceeds all the others in the extent of saline impregnation. On an average, for there is a difference in this respect in various latitudes, the quantity of saline matter appears to be about one twenty-ninth; of which, from the experiments of Bergmann and Lavoisier, there are about 20 muriate of soda, 5 muriate of magnesia, 3 sulphates of magnesia and soda, and 1 sulphate of lime.* An analysis by Dr Murray himself, gives, out of 10,000 parts of water obtained from the frith of Forth, 220.01 parts of common salt, 33.16 sulphate of soda, 42.08 muriate of magnesia, and 7.84 muriate of lime. Dr Wollaston has detected potassa in sea water; and it likewise

* Murray's *Materia Medica*. Turner's *Chemistry*, Bache's edition, 1830.

contains small quantities of hydriodic and hydrobromic acids. The subjoined table of the quantity and proportions of saline matter in a pint or 28.875 cubic inches of sea water, will better enable the reader to compare the strength of this fluid with that of mineral waters in general. The water was taken up near the shore at Ramsgate (England), while an east wind was blowing.

Muriate of soda,	231.75 grains,
Muriate of magnesia,	59.00 “
Sulphate of lime,	6.00 “
Muriate of lime,	1.50 “
	<hr/>
Saline substances,	298.25
Animal, and vegetable, and extractive matter,	10.50
	<hr/>
	308.75

Analysis of the water at other parts of the coast gave of saline ingredients, to the pint, 302 grains and 280 grains respectively; and in one instance, where it was obtained at the depth of sixty fathoms, it yielded 265 grains. The medium result from these different analyses is within a fraction of 287 grains, or more than half an ounce to the pint of sea water. By comparing this fluid with some of the mineral springs most abounding in saline impregnation, we discover that in this respect it is nearly four times as strong as the water of Congress spring at Saratoga, and has the relation to that of Seidlitz as nearly 22 to 15. When, in addition to this, we reflect that sea water contains some iodine and bromine, in the form of hydriodic and hydrobromic acid, united with salifiable bases, we cannot but feel surprised that it has not been more largely and generally drunk for medicinal purposes. If chemical analysis

be of any value to the physician, it should certainly lead him to a much freer and more frequent use of this water. But we have, in the experience of some of the English medical writers, direct proofs of its efficacy in the cure of various diseases, especially in those in which the scrofulous diathesis predominates.

Sea water is used medicinally, either as an aperient or an alterative. A pint in the morning before breakfast, in two doses at half an hour's interval between them, will usually suffice to produce the first mentioned effect. It is remarked, however, by Buchan, that when this quantity does not pass off readily, it heats and irritates the habit, and deranges the system for the whole of the day. It is a much preferable practice to drink half a pint at bed time, and the same quantity, mixed with as much boiling water as is sufficient to warm it, the following morning. Taken in this manner, it hardly ever disturbs the bowels in the night; while it never fails, taken even in a smaller dose, to produce the desired effect, and is seldom productive of that distressing thirst, which is the consequence of taking the whole measure requisite at once.

“Even for those who are in good health, a single purge of sea water, taken in the manner now directed, which, when it operates duly, like other saline cathartics, leaves the body cool and active, is a very proper prelude to the use of the bath. But as the operation of a purgative always diminishes the general vigour of the system, it is very improper to bathe on the same day the water is used internally; a precaution which is too often neglected.

“Sea water is a purgative by no means adapted to every variety of constitution. When the bowels are loaded with viscid phlegm, it answers particularly

well, and the use of it frequently restores health and appetite. But in irritable, hectic, and what are termed bilious habits, it heats the body, and occasions considerable, and sometimes permanent disorders of the organs of digestion. When purgatives are previously known to disagree with the constitution, the use of sea water internally should not be ventured on.”

When the water is slow to operate, or does not pass off by the bowels, its action may be assisted by adding to it a drachm or two of Epsom salts, and drinking afterwards some cream of tartar water, which both serves to remove thirst and to aid the purgative effect of the sea water; or two or three grains of calomel may be taken over night, and a half pint of the water, warmed and diluted as above, drunk in the morning.

“In some cases, it answers better to take about a pint at bed time, abstaining from supper; it rarely occasions thirst, and the usual breakfast of warm tea promotes the operation, after which a person may bathe with safety, if so inclined.

“The thirst occasioned by drinking sea water produces an eager desire for the usual breakfast of tea. It is much better, however, to postpone the time of that meal till the purgative operation of the water is over, and to assuage the thirst by some thin gruel, whey, or, what answers the purpose most effectually, a slight infusion of tamarinds or apples. Sea water, like every other purgative, deranges for a time the functions of digestion. If the customary breakfast of tea, with bread and butter, be taken within too short a time afterwards, instead of undergoing the regular process of digestion, the different ingredients separate from each other, and the oily parts floating uppermost, irritate the cardiac orifice of the stomach, and

occasion a distressing kind of rancid heart-burn. This unpleasant sensation may in general be removed by permitting some gum arabic to dissolve in the mouth, which, as it gradually descends into the stomach, produces the mechanical reunion of the aqueous and oleaginous part of the aliment.

“Those who do not labour under any particular disease for which the internal use of sea water is considered as a remedy, should not have recourse to it as a purgative oftener than once in eight or ten days. It is, moreover, to be observed, that the use of sea water is not, like many other purgatives, followed by a torpid or constipated state of the bowels, but is rather productive of an increased action of the intestinal canal, which continues for some days.”

As an alterative in smaller quantity than just indicated, sea water has been administered in many chronic maladies with excellent effects. Buchan recommends a wineglass-full to be taken every evening at bed time. My own experience, personal and professional, would lead me to prefer an early morning hour, and at noon or one o'clock, for the administration of the remedy, in the dose above stated. It has very little marked action on the bowels in this quantity; but it exerts a salutary tonic power on the stomach in cases of dyspepsia with irregular appetite and laborious digestion. Should two wineglass-fulls be found to disturb the bowels without purging, half a glass each time might be taken, and some simple diluent drunk during the interval, or when there was thirst. By this means we should obtain in a few weeks a marked and salutary amelioration, and not unfrequently a cure of numerous glandular engorgements and obstructions; whether of the lymphatic

system, as in scrofulous tumours and ulcers, or of the chylopoetic viscera, as of the liver and mesenteric glands.

I fully coincide with Buchan in the following opinion. "The internal use of sea water, taken daily in small quantities, may be persisted in for a considerable length of time, without debilitating the body, or in any way injuring the constitution. On the contrary, I have observed many persons acquire flesh and strength during such a course."

Cutaneous and *nephritic* complaints have been cured by drinking sea water. As a purge it is found to be useful in paralytic complaints. Its vermifuge power has been well attested in procuring the expulsion of *ascarides*, when it has been drunk for some time in alterative doses.

In some of the diseases mentioned, if hectic fever is established, the sea water ought not to be used.

It has been said, I know not how correctly, having never instituted comparative trials, that sea water taken a great distance from land, and from some fathoms under the surface, although intensely salt, is free from that nauseous taste it possesses when procured near the shore.

Another circumstance worthy of notice by the invalid is, that if we permit sea water to remain at rest twelve hours before it is used, it depurates itself, "the lighter feculencies rising to the top, and the finer particles of sand, which are often mixed with it in considerable quantity, subsiding to the bottom: if it be then drawn off by an aperture near the lower part of the vessel in which it is contained, the nauseous taste will be found much less perceptible."*

* Buchan.

CHAPTER VII.

Efficacy of many natural thermal waters dependent on dilution and temperature.—In what these waters differ from common warm and hot water.—Effects of dilution by simple pure water shown in the cures performed by that of the Malvern Springs.—On the same principle we explain the remedial power of the Matlack, Bristol, and Buxton waters of England.—Bath water, in disease, acts mainly by its temperature—the cases benefited by its external use, as a bath, and internal, for drink.—A direct application of this knowledge of the English waters to those of the thermal class—the Warm and Hot Springs, in Virginia.—Great inducements to visit the Virginia Springs on the score of their number, and the variety of their mineral impregnation, and temperature.—Natural beauties in the upper and middle section of that State.—Advantages of travel for the invalid who intends visiting mineral springs.

THERE is a large division of thermal springs, the mineral ingredients in which are so small, that we cannot predicate of these any beneficial effects from drinking the waters or using them as a bath: and yet, as unquestionable benefits have followed their use in both ways, we are constrained to explain

such occurrences by their temperature. Some, while admitting the fact, are not satisfied with the explanation, and contend that caloric is combined with the waters of thermal springs in a peculiar manner. They tell us, that these waters will not, under otherwise similar circumstances, enter into ebullition sooner than common water; they are, moreover, slower in cooling than the latter, and they do not so soon yield up the gases with which they may be saturated. Even at a high heat they give freshness and additional beauty to vegetation in place of weakening and fading it. Natural thermal waters, at as high a heat as those of Bourbon L'Archambault, for example, which are 140° to 144° F., are drunk without any unpleasant impression on the tongue or palate, whilst common water of a temperature twenty degrees less would burn them, and be productive of serious accidents. Finally, it is alleged, that persons who bathe in thermal springs experience effects very different from those following the use of the common domestic warm bath.

After all, we shall not be far wrong in attributing the chief remedial virtues of the simpler thermal waters, when used as a drink, to temperature and dilution. The series of phenomena produced by the application of external are repeated on the application of internal warmth, but with an augmentation of energy and diffusiveness, in proportion as the influence of the stomach over the brain and heart is more immediate and direct than the sympathy between these organs and the skin. If to the effects of nervous excitement caused by warm water acting on the sentient surface of the stomach, be added those of vascular fullness, caused by the absorption of a large quantity of simple

fluid, we can easily understand how drinking thermal waters should be attended with such marked benefit in numerous chronic maladies.

In the whole tribe of diseases indicated by exalted sensations of a neuralgic character—spasm, and pain of the stomach and bowels, whether rheumatic or gouty, or constituting common colic, or occurring in chronic dysentery—pains of the limbs located in the fibrous or synovial membranes, and giving rise to chronic rheumatism and gout—dry, scaly eruptions of the skin, or those of an erysipelatous character—hemispheres, or pain of one side of the head, or tic douloureux—general irritability, as it is called, accompanied by obtuse but painful sensations in the digestive apparatus, inequality of disposition, great wakefulness, and inability to fix the mind long on one object: in all those maladies, and we may include irregular spasmodic attacks, with great pain of the genital and urinary organs, free dilution by drinking simple thermal waters, and regular bathing by immersion in the same, will be found as efficacious as they are easy and pleasant; and if aided by simplicity of regimen and moderate exercise, can hardly fail to bring about changes in the animal economy no less agreeable than often unexpected.

The most sceptical on the subject of our accomplishing great results by simple means, cannot retain their doubts after witnessing or hearing recorded the numerous cures of various maladies by the use of the Malvern waters as a drink and for bathing, and by inhaling the pure and refreshing air of that region of country. It must however seem, after all, an incredible fact to many, that a water like that of the two principal springs at Malvern, should have acquired

such celebrity for the cure of disease, and ranked so high in the class of mineral waters, when it contains no more than three or four grains of foreign or solid matter to the gallon.

Divesting ourselves of prejudice or prepossession derived from the professional and scholastic refinements of one class, and the love of the marvellous and spirit of exaggeration of the other, we shall be compelled to grant, that whatever good effects have been evinced on drinking the waters of Buxton, Matlack, Bristol, and Bath, in England, and of Lebanon, the Warm and Hot springs, in Virginia, they are mainly explicable on the principle of dilution and temperature. Dr Scudamore, a writer by no means ready to abandon art in favour of nature, or to assign a virtue to a simple when it can be contested by a compound, admits, that "the medicinal action of Buxton water must be referred to its purity, its temperature (82° F.), and its gaseous impregnation with azote." To the last, which is only about four cubic inches and three-quarters in the gallon, we cannot attribute any notable effect. Of Matlack water, its chief praises by the same pen are, "its purity, its agreeable temperature (68°), and its freshness." The inference from the analysis of Bristol waters, says Saunders, "is, that it is considerably pure for a natural spring, containing no other solid matter than is found in almost all common spring water, and in less quantity." A little farther on, the author describes it "as a pure, warm, (74°), slightly acidulated spring." Well is it said, on the same authority, that this water may be more safely tried in every state of health than most other mineral springs: and for this very sufficient reason, that pure water, whether given to quench thirst, or for the pur-

poses of dilution and remoter medicinal powers, is not only safer than mineral waters, but is the safest substance in nature during disease.

The same opinions, and on the same foundation, viz. its acknowledged purity, are applicable, in every respect, to the water of Lebanon spring in the state of New York. Its temperature, 74°, is the same as that of the Bristol Well, and its purity is attested by Dr Meade, who considers it meriting this character “as much so as any water flowing from the bowels of the earth which has been as yet examined.”

No little, and in many cases, the chief benefit obtained from visiting the springs above mentioned, has been by using the waters as a bath. The conditions for adapting them to this end are the same as those already stated, when I treated regularly of the cold bath, and took occasion to point out the effects of tepid bathing. An invalid too feverish and with too much gastric irritation to risk the drinking of the Harrogate and Cheltenham waters among the cold mineral springs, or those of Bath among the simple thermal ones, would often recover surprisingly by the simple cold water, both internally and externally, of Malvern water, or the cool of Matlack, the slightly tepid of Bristol and Lebanon, and even of Buxton.

Presuming the disease to be farther advanced, and more unquestionably chronic, and marked by exhausted excitement, inertia, langour of the functions generally, cool skin and feeble pulse, or of a simple neuralgic character, without morbid vascular action, then might recourse be advantageously had, both by drinking and external use, to the distinctly marked thermal waters of Bath, and of the Warm and Hot springs of Virginia and of North Carolina.

The analysis of the waters of Bath in England by no means justify our placing any reliance on their efficacy, derived from mineral impregnation; whilst, on the other hand, all the phenomena attributed to drinking them by gouty persons, as well as their reputed curative powers in various maladies, are readily explicable, by our knowledge of the operation on the animal economy of free draughts of simple warm or hot water.

Dr Scudamore thinks the Bath waters best adapted to “the chronic form of gout, where there is great deficiency of nervous energy in the muscles, joined with languid circulation in the extremities, and stiffness with aching pains in the joints upon every motion.” The baths at this place are represented as highly useful, though not a remedy of universal application in this complaint. They will be found most efficacious in those forms where the inflammatory diathesis is absent, and in which there is but little tendency to febrile irritation. But we are not, according to Scudamore, to lose sight of the superior pretensions of the Buxton bath for most conditions of gout and rheumatism. This opinion, if explained, seems to me to be equivalent to saying, that in the predominance of inflammatory irritation so common in the earlier and even secondary stages of these diseases, the sedative action of a bath at 82° F. is preferable to the stimulating action of a bath at upwards of 100° F.

The almost literal application of these views and facts may be made by the invalid to his use of the Warm and Hot springs. Of these, as furnishing means for delightful bathing, I have already spoken. My object at present is, to direct attention to their remedial value when drunk in conjunction with their

external use. The mineral impregnation of the waters of the Warm spring is very small, being not more than five grains to the quart; we are, therefore, safe in ranking them among the pure thermal waters, with a gaseous addition, chiefly, we may presume, of nitrogen gas.

Adjoining the chief warm spring, and a little lower down in the meadow, is a chalybeate water, which in complaints of debility, without fever or inflammatory determination of any kind, may be drunk by the invalid while making use of the bath.

The water of the Hot Springs is also weak in saline matter, exhibiting only about fourteen grains to the quart; of these a minute fraction is carbonated iron.

In a large tribe of dyspeptic and nephritic complaints, rheumatism and cutaneous affections, derangements of menstruation, fluor albus, &c. the successive use of the waters and bath of the Sweet spring, the Warm spring, and the Hot spring, going from one to the other, according to the diminution of febrile irritation, thirst and heat, will often be productive of the very best results. All that has been performed by the Bristol, Buxton and Bath waters of England, may be safely claimed as of easy fulfilment by the use of the Virginia waters just enumerated. If to these springs—the *Sweet*, the *Warm* and the *Hot*, be added the *White Sulphur*, the *Salt Sulphur* and the *Red Sulphur*, we can safely challenge any district of country of the same extent in the world, as that in which these springs are situated, to produce the same number and variety, whether we have regard to mineral impregnation or temperature; or the use of which shall be attended with more speedy, entire, and permanent relief from a host of the most distressing maladies.

In addition to the inducements presented to invalids and the inhabitants of our northern and eastern cities by the springs themselves, there are all the pleasures to be derived from scenery of the most varied and picturesque character—natural objects without number, calculated, some to inspire with sentiments of the sublime at their size, grandeur and wild appearance, others to fill the breast with tranquil emotions at the sight of the softened beauties of the landscape spread out before them.

The traveller from the north and east who should shape his course for these springs, either after leaving Baltimore, or entering the state from York, Pennsylvania, would pass through the fertile and highly cultivated district of Maryland, of which Fredericktown is the centre; and in a short time would find himself at Harper's Ferry; there, with Jefferson's Notes in his hands, he might admire that mighty disruption in which the united streams of the Potomac and Shenandoah forced their way through the mountain, to pour their waters to the low country, and be finally received in the Chesapeake Bay. From "The Ferry," he continues his route up the valley of Virginia, the garden of the state, containing much of its agricultural wealth, and inhabited by a thriving, industrious and generally intelligent population. Winchester, a flourishing town, thirty miles from the Ferry, may invite his stay for a day or two; either for repose, or enjoying, if it so list him, conversation with its inhabitants on law, physic, farming, or manufacturing; for on all these topics is the good old town well prepared to give him information out of the mouths of the representatives of those respective professions and interests. Continuing on the main stage road, the traveller next

reaches Staunton; but before this he will be well content to exchange the high for the by-way, and visit the celebrated Wyer's cave, three miles from Port Republic, with its splendid apartments and galleries, which, when lighted up, seem to realize in their immense extent and glittering and fantastic columns and cornices, reflecting all colours, the scenes of eastern enchantment. Arrived at Staunton, the traveller may go directly to the Warm springs at Bath Court House, or make a circuit of an additional day's journey to Lexington and the Natural Bridge. This last piece of Nature's grander works, rivalling in sublimity of effect the falls of Niagara, has been oft described; but no language can do adequate justice to the feelings of awe, experienced when looking from the edge down to the deep glen below, or the subdued delight in afterwards gazing from the bank of the stream beneath at the lofty arch and adjoining rocky parapet, tufted with shrubbery.

“ Well might such scenes to wondering mortal's eye,
Pass for the visions of another world ;
When looking up at yonder arch on high,
By heavenly architect from chaos hurl'd.”

“ Fit emblem this of the Almighty span;
Mixt majesty, and harmony, and force.
So, in the stream beneath, of giddy man
We see the ever restless devious course.”

Leaving Lexington, a ride of 36 miles brings the traveller to the Warm springs, after his having passed by the Blowing cave, and traversed the Warm Spring mountain, the summit of which commands a glorious prospect of the surrounding country.

The approach to this region from the lower counties is by the road running contiguous to James River, and

afterwards leaving it for Staunton. By this route the traveller can return home, visiting Richmond and Norfolk, and coming round by way of the Chesapeake Bay to Baltimore, thence to Philadelphia, New York, &c.

The invalid whose infirmities are such that a long journey on land would be impracticable, will prefer this last route, but on no other condition is it to have a preference over the first, that is, through the Valley from Harper's Ferry to Staunton. The length of the journey, and the jolting over hilly and rough roads, so much dreaded by the nervous and the hypochondriacal, is of itself an admirable remedial agent, and forms a good preparative for the use of the waters of the Springs; or on occasions will complete a cure happily commenced by bathing in, and drinking of the latter.

THE END.