

**Practical observations on mineral waters and baths; with notices of some continental climates, and a reprint (the third) of the Cold-water cure / by Edwin Lee.**

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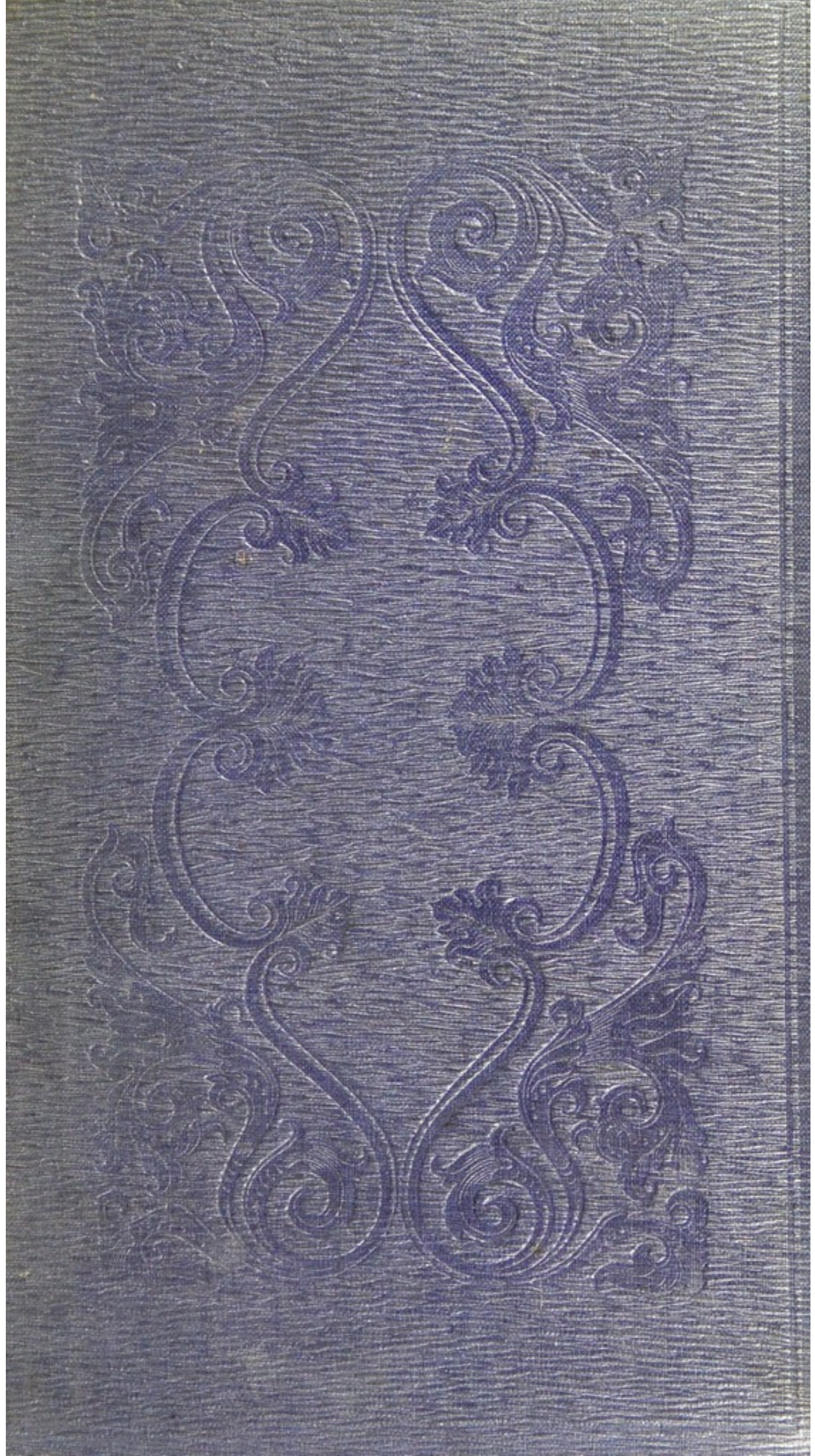
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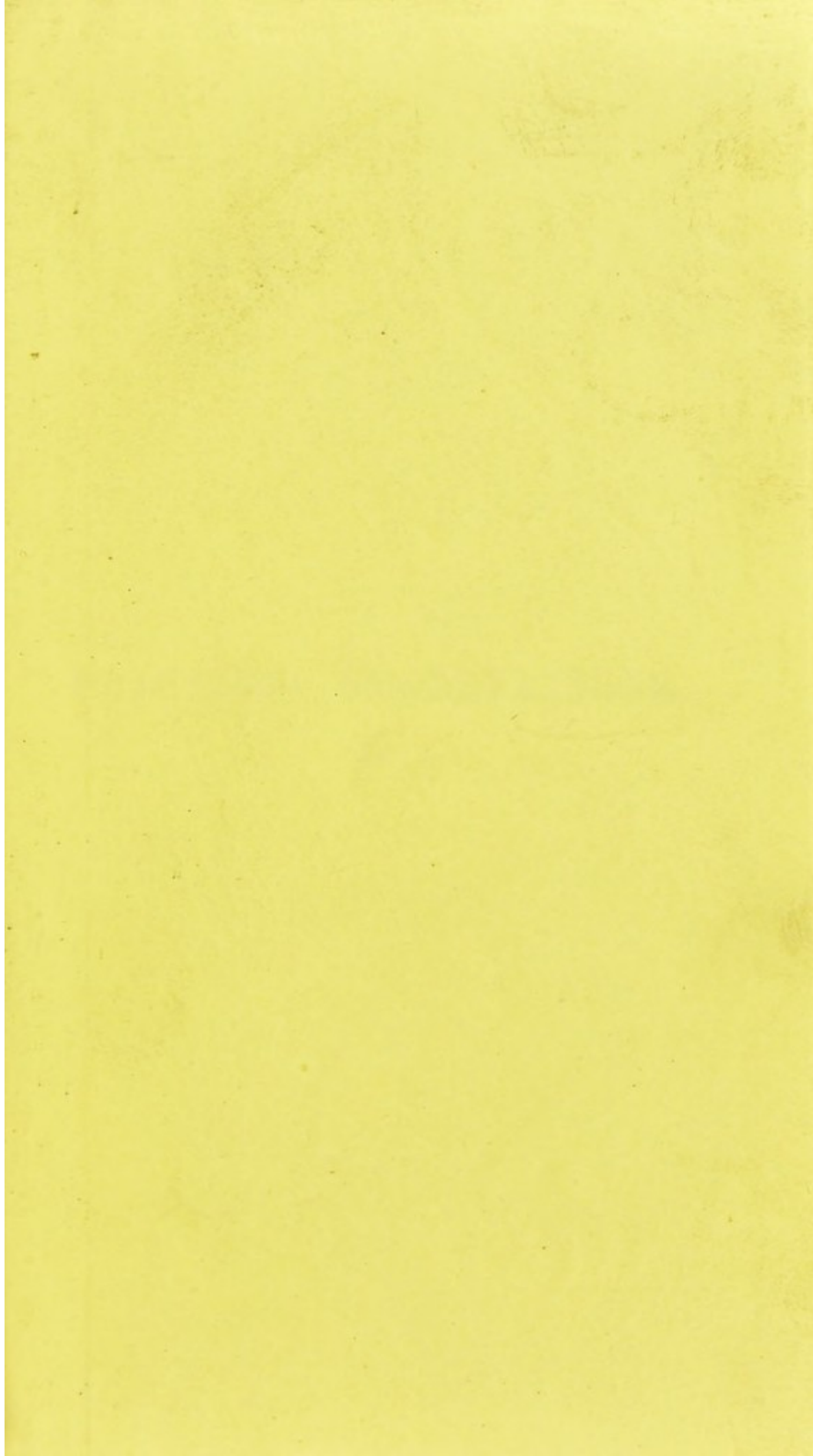
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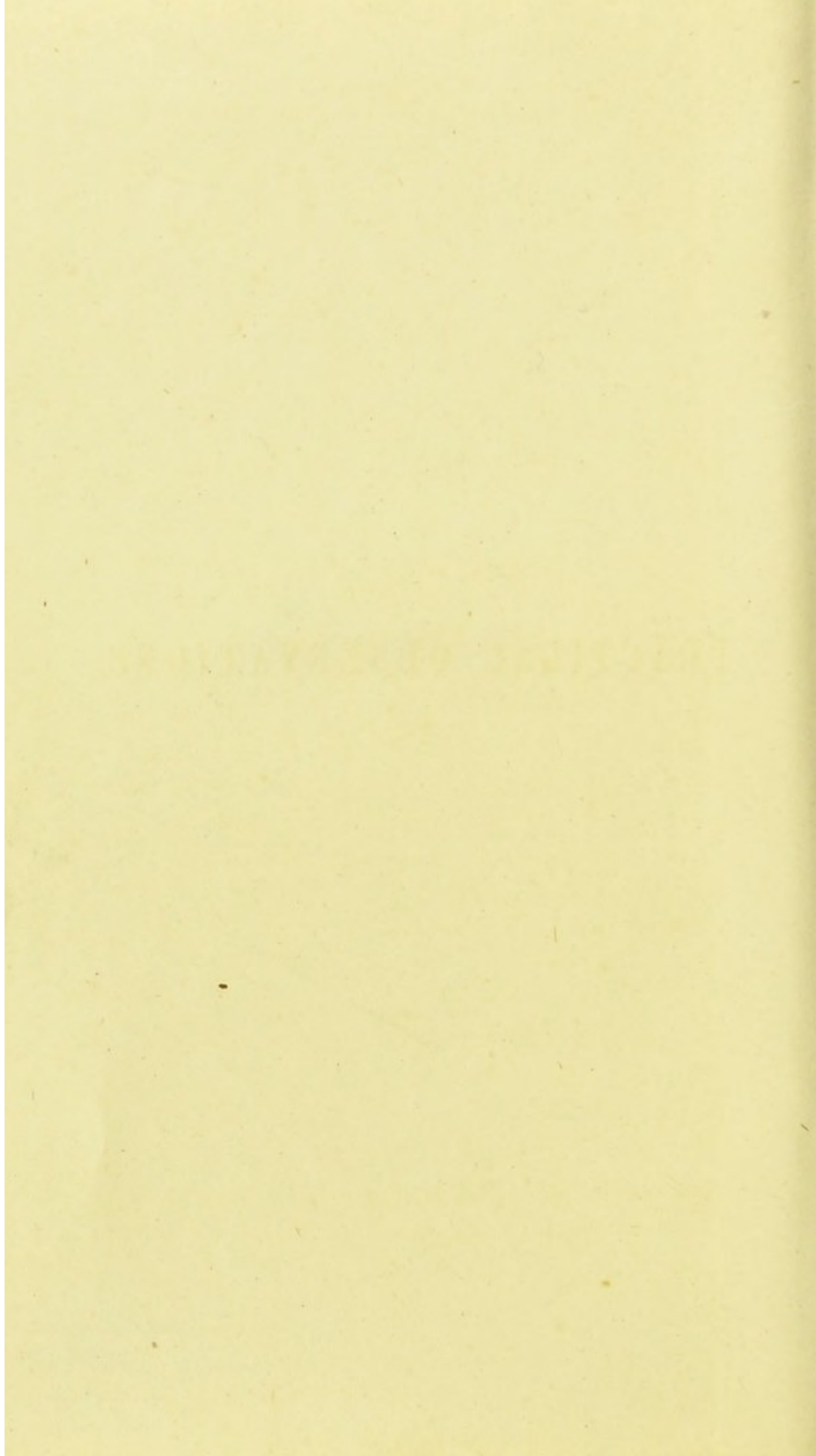
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PRACTICAL OBSERVATIONS  
ON  
MINERAL WATERS  
AND  
BATHS;

NOTICES OF THE CLIMATE

OF THE SEVERAL RESORTS

PRACTICAL OBSERVATIONS,

&c.



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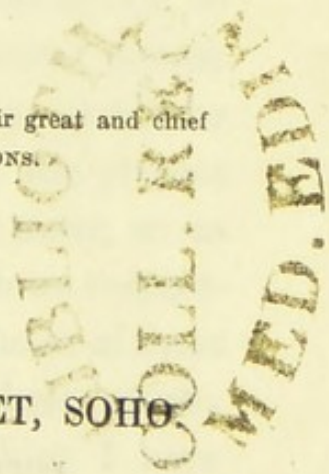
PRACTICAL OBSERVATIONS  
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MINERAL WATERS  
AND  
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WITH  
NOTICES OF SOME CONTINENTAL CLIMATES,  
AND  
A REPRINT (THE THIRD)  
OF THE  
COLD-WATER CURE.

BY EDWIN LEE, ESQ.

FELLOW OF THE ROYAL MEDICO-CHIRURGICAL SOCIETY; CORRESPONDING  
AND HONORARY MEMBER OF THE IMPERIAL MEDICAL ACADEMY OF VIENNA,  
THE ROYAL ACADEMY OF NAPLES, AND THE PRINCIPAL CONTINENTAL MEDICAL  
SOCIETIES; AUTHOR OF THE "BATHS OF GERMANY," &c.

Mineral waters may answer other purposes, but certainly their great and chief  
use is the preservation and health of man.—STURM'S REFLECTIONS.

LONDON:  
JOHN CHURCHILL, PRINCES STREET, SOHO.  
1846.



PRACTICAL OBSERVATIONS

MINERAL WATERS

BATHS

NOTES OF SOME CONTINENTAL CLIMATES

(A SECOND EDITION)

GOLD-WATER CURE

BY EDWIN LEE, ESQ.

A TREATISE ON THE NATURE AND EFFECTS OF THE MINERAL WATERS OF THE CONTINENT, AND THE CLIMATE OF THE MOUNTAINS OF SWITZERLAND, ITALY, AND SPAIN, WITH A DESCRIPTION OF THE GOLD-WATER CURE.

WITH A PRACTICAL SYSTEM OF THERAPEUTICS, AND A HISTORY OF THE GOLD-WATER CURE.

LONDON:

JOHN CHURCHILL, ST. JAMES'S STREET.

PRINTED BY G. J. PALMER, SAVOY STREET, STRAND.

## PREFACE.

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THE great advantage which so many invalids derive from mineral waters has occasioned a more just appreciation of the value of these therapeutical agents of late years, both by the profession and the public, though from the deficiency of knowledge which still very generally prevails in this country respecting their effects and mode of action, the selection of particular waters and their administration are frequently not the most calculated to procure the greatest amount of benefit, even if they be not often altogether erroneous; for it is notorious that in general but little reliance can be placed upon the partial accounts given in works written with the view of recommending this or that particular bath. I have, therefore, endeavoured in the present work to treat the subject in a general manner, so as to contribute to the diffusion of clearer views respecting the practical application and proper choice of these remedies, to which my attention has been chiefly directed, during the summer seasons which I have

passed in the Duchy of Nassau, and in my frequent visits in the course of the last twelve years to the principal German and French baths, as also from the study of the standard foreign authors upon the subject; and I have not dwelt upon those details, as the geological, &c., which, however interesting they may be to the scientific inquirer, do not bear upon this part of the question. Several of the general remarks which form the introductory portion of the "Baths of Germany" have necessarily been repeated, though this has been avoided as much as possible; so that those persons who desire information respecting the localities and properties of the particular baths, will still find in that volume what they require.

13, *Curzon Street,*

*May, 1486.*

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PRACTICAL OBSERVATIONS  
ON  
MINERAL WATERS AND BATHS.

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CHAPTER I.

PRELIMINARY REMARKS.

THE great degree of attention which, especially of late years, has been directed to the chemical composition of the constituent parts of the body, of the blood and secretions, has materially contributed to elucidate the pathology of several diseases. It would be, however, foreign to the purpose to enter, on the present occasion, upon this wide field of inquiry; I shall, therefore, restrict the remarks on this part of the subject to a few points of analogy, which will be found to exist between some of the chemical constituents of the body and of mineral waters, and to noting the action of some substances upon the blood and secretions, whence the inference may readily be deduced of the great value of these agents in remedying disordered states of the system. Thus, the basis water enters so largely into the composition of the human body, that it has been ascertained, that even of the more solid parts, as the bones, but a very small residuum remains after desiccation.

Water also constitutes the greater part of the blood, and the whole of other secretions, with the exception of a fractional portion. "In the animal economy, as on the surface of the earth, water is carried in a constant circuit, sometimes in a fluid, at others in a solid, at others, again, in a vapoury state, but it every where bears matters with it which belong to the organization, in order to deposit them in their appointed place." (Vetter.)

Muriate of soda, which forms a component part in almost all the important thermal springs, is found on analysis, in all the fluids and soft parts of the body, of which it is a necessary ingredient. It is well known that many animals cannot long exist in a healthy state when fed upon food which does not contain salt. At some plantations in the West Indies, it was observed that the negroes pined away and soon died; whereas, at some others, where the same kind of food was given, they were in a thriving condition. This was found to depend upon the circumstance that salt was allowed to the slaves in the latter instance. Sulphur combined with oxygen and water, is found in the body, and this substance also enters into the composition of several of the most efficacious springs. The sulphates of soda, potass, and lime, though in very minute quantity, are likewise found to exist in the body, as well as in mineral waters.

Carbon forms an important element of the principal parts of the body, and though free carbonic acid does not exist in it, yet combined with vegetable alkalies it is found in all parts. The alkaline carbonates exist in all the solids and fluids, and carbonate of soda, which forms a principal ingredient in many of the most important waters, is found in the chyle and blood, of which it prevents the too rapid coagulation. The earthy carbonates, as lime and magnesia, are only in minute proportion in the body, as also in mineral waters.

Iron, the predominance of which, in mineral springs,

constitutes an important class, is an essential component part of the animal economy, and is found in the chyle, lymph, and blood, in the muscles and bones, and in the secretions, including woman's milk. The quantity of iron in the blood bears an exact proportion to that of its red globules. By the abstraction of blood the quantity of fibrin is diminished. By the exhibition of preparations of this metal, the quantity of fibrin is increased, and the blood assumes a brighter red colour. It has been, however, demonstrated by experiments on rabbits, that iron can be absorbed into the blood only in a limited quantity, whatever be the amount given, the remainder passing off by the bowels.

These instances may perhaps suffice to illustrate the position which I have advanced, but the action of saline substances upon the blood, from which the solids are formed, as shown by the experiments of Hewson, and more recently of Prevost and Dumas, as also of Müller and Schultze, in Germany, are highly interesting, as affording evidence of the effects to be derived from mineral waters. These gentlemen perceived, that acids and solutions of salts affected the form and composition of the blood globules, which are not altogether fluid as was formerly supposed, but are hollow vesicles, into which air is absorbed in the process of respiration. If a solution of muriatic salts, thinner than the serum, be applied to the blood, its colour becomes darker, but if the solution be more concentrated, the colour of the blood is rendered lighter, and the globules are flattened. By the continued use of alkalies, the blood is rendered more fluid, the coagulation of its fibrin is prevented, and its colour becomes brighter: on the other hand, the use of nitric acid produces an inflammatory coat.

"It is known," says M. Anglada, "that the continued use of alkalies weakens, in a remarkable manner, the plastic force of the blood, lessens the tendency to coagulation, and forms a less consistent clot. Must

not this induce relaxation of the system, allay irritation, and have a sedative action upon certain organs when over-stimulated; and ought they not, consequently, to be employed in numerous cases? The free use of alkalies is said to produce too great a thinness of the blood, and disorder of the digestion. This may be the case in some instances, but not generally, especially when they are required by disordered conditions, as when an acid diathesis prevails. At Vichy large quantities of the alkaline water are taken daily in cases of gout and stone." Alkalies in the pharmaceutical form, may likewise be given in analogous cases, in large doses, and it is a well-known fact, that the health of workmen employed in soda works, does not suffer from their occupation.

A German author observes upon the same point, "The neutral salts soluble in water, which are found in the body, cause the expansion to a considerable extent of certain organic substances, and on the other hand, contract or draw others together. They have the property of dissolving some of them, of maintaining them fluid, and of modifying the combinations of others among themselves. The salts of the blood are the only active constituents which maintain the albumen, which, of itself, is insoluble in water, in a state of solution, and this twofold combination is again the only medium of dissolving fatty and other insoluble substances, and of carrying them along with it into the circulation.

"If we apply these facts to therapeutical and pharmaceutical principles, the conclusion is readily deducible, that the quantity and quality of saline combinations, especially as they occur in mineral waters, exert the most marked influence upon the qualities and fluidity of the blood, its physical and chemical nature, as well as upon its circulating, secreting, and excreting powers." (Schwartz, *Allgemeine Heilquellenlehre*.)

The gases which most frequently come into con-

tact with the blood in the living body, produce effects opposed to each other. Carbonic acid applied to the blood, renders its globules darker-coloured, duller, thicker, and makes them run closer together. The dark colour of the blood in animals asphixied in carbonic acid, is well known. Oxygen produces opposite effects, the blood being rendered lighter, more florid, and the circulation more active.\*

The composition of the blood becomes materially altered in certain diseases, of which also this alteration is not unfrequently a cause. Dr. Carswell states that tubercle is never formed when the blood is not in a diseased state; the same may be said of the gouty and calculous diathesis. In patients who have long laboured under gout, the blood is found to be loaded with earthy phosphates, and azotised substance, and even crystals of the salts eliminated in gout have been detected in it. Acidity predominates in the blood and secretions of scrofulous patients. In acute inflammation the quantity of fibrin in the blood is increased, and according to Bellingheri, the blood, under these circumstances, possesses more electricity than in health. On the other hand, the electricity is less in diseases characterised by debility; and in most chronic diseases, the quantity of fibrin is diminished; the blood

\* From this may be perceived how, in persons leading a sedentary life, and breathing the carbonised air of close or badly-ventilated apartments, the quality of the blood is altered, its circulation is retarded, and congestion of the liver and other organs takes place. Nothing removes this state better than active exercise in the open air, by which the respiration is rendered more perfect and more oxygen absorbed. A recent author observes, however, that oxygen is not the real cause of the colour of arterial blood. "The salts contained in the blood are the true cause of the passage of the colouring matter from black to red. Oxygen reddens venous blood only in an indirect manner, by removing the carbonic acid which neutralized the action of the salts, but as soon as the carbonic acid has been eliminated by it, which takes place in the lungs, the blood becomes red, not from the absorption of the gas, but in consequence of the action of the salts. A saline solution more saturated than the serum of ordinary blood, will impart to venous the colour of arterial blood, even in an atmosphere of carbonic acid, sufficiently deleterious to kill rabbits in less than three minutes."—L'Heritier, *Chemie Pathologique*.

in females is more watery than in males, and that of children and old people is always more so than in healthy adults.

An abnormal condition of the blood may depend upon various causes, as when transmitted from parents, in debilitated subjects, from breathing a vitiated air, from deficiency or excess of food, or from its bad quality. A bad alimentation forms bad chyle, hence, the blood becomes altered from its healthy state. "How often, for instance, has it not occurred that damaged rice or rye has changed the condition of the blood, so far as to produce gangrene of the extremities. A too exclusive nourishment with animal food, by increasing the relative quantity of fibrine, renders the blood too rich, and thus disposes to gravel, gout, and inflammatory diseases. So long, however, as the vital energy of the economy is sufficient for the regular accomplishment of the functions, noxious matters rarely accumulate in the blood to such an extent as to alter it, but if any influence arises to depress this energy when the blood is already imperfectly formed, or insufficiently animalized and purified, and consequently when some of its elements are modified in their quantity or quality, disorders arise which terminate either in the elimination of noxious matters, or by a series of pathological actions and organic lesions."\*

The influence of the chemical action of substances introduced into the economy though great, must not, however, be over-estimated, to which there is a tendency in the present day; that of the dynamic or vital powers in controlling this action, not being always sufficiently considered, for operations do not take place in the living body as in a laboratory; but in proportion as the vital powers decline, chemical actions and affinities come more freely into play. Alterations in the quantity, quality, and chemical composition of

\* L'Heritier *Chemie Pathologique*. Paris, 1842.

the blood and secretions frequently depend upon causes acting directly upon the vital powers through the nervous system, as seen in the changes which are produced from mental impressions of an agreeable or painful nature, as in the instances of an increased flow of tears, the change in the urine in hysterical patients, &c. Organic changes are often produced by similar causes. Scirrhus tumours, for instance, are not unfrequently caused by depressing emotions, as grief, anxiety, &c.; acting in the first instance upon the cerebro-spinal nervous system, and consecutively upon the capillary vessels and nerves of a part, by which its fluids become altered or arrested. So, in like manner, indurations of viscera, and other local, structural, and functional changes may be induced by derangement of the functions, or by direct lesion of the sympathetic or organic nerves, which, united by numerous inosculations with those of the cerebro-spinal system, extend their influence to all parts of the body, and which have been proved by the experiments of M. Brachet, to preside over the action of the capillary vessels, and of the functions of nutrition and secretion. An abnormal condition of the organic nervous system, or of part of it, frequently depends upon alteration of the quantity or the quality of the blood by which it is nourished, and when this is the case, it does not fail to react upon, and increase the disordered condition of the vascular system. When several years ago it was observed, that a section or mechanical lesion of the branch of the fifth pair of nerves supplying the eye, produced increased vascularity, with subsequent sloughing of the cornea, inflammation was supposed to have been produced by the experiment, and to have given rise to this result. A similar effect, however, was subsequently found to ensue in animals which were fed upon sugar, or other substances in too concentrated a state to afford them proper nourishment; and M. Brachet clearly demonstrates that the circumstance did not depend upon inflammation, but simply

upon mechanical distension, and consequent obstruction of the circulation through the capillary vessels from their privation of nervous energy.\*

Hence we may see that various states which have been considered as inflammatory, are not so, but depend upon impaired nervous energy; and why depleting measures would be prejudicial, while those calculated to give tone to the nervous system would be most successful: why the spleen should be so frequently congested after attacks of intermittent fever, while the more dense texture of the liver is comparatively seldom affected; and why bark tends to reduce the splenic enlargement; why the congested state of the vessels of the eye in strumous ophthalmia should frequently continue so long without producing serious injury; and why, though the local abstraction of blood may occasionally be of service in relieving the congestion, its too frequent repetition predisposes to relapses, which are best prevented, and a cure most permanently effected by tonic remedies and local stimulants, which strengthen the system generally, and excite the torpid and relaxed vessels to action. Chilblain is another illustration of the same principle; congestion taking place in parts of the body remote from the centre of circulation, when their nervous energy has been depressed by cold. Dropsical effusions also very frequently occur in the same manner, the serum of the blood transuding through the capillaries, in parts where the cellular texture is lax, and whence the blood meets with obstacles in returning to the heart: softening of the nervous centres, and paralysis, occur doubtless not unfrequently from the same cause, viz. a deficiency of nutrition of their substance from the nervous energy of the capillaries being impaired, as is pretty evident from the circumstance of these diseases most generally occurring in elderly persons,

\* Du Système Nerveux Ganglionaire.

and in those whose vital powers have become depressed. I have met with several cases of paralysis, consequent upon excesses, from the influence of malaria, &c., or occurring without any evident cause, in which the too indiscriminate use of blood-letting and other depleting measures had been extremely prejudicial, and in which the subsequent employment of a tonic regimen was productive of the greatest benefit.

“The elements of general and internal diseases, or of morbid predispositions,” observes Dr. Kreysig, “which constitute the most important object of treatment, may then all be reduced to vitiated states (dyscrasies) of the blood and lymph, or to *infirmity* of the nervous system. These vitiated states may be considered as an affection of the vitality of these humours, and also as regards their origin, which depends sometimes upon external influences of a specific nature, (contagious endemic, or miasmatic); and sometimes upon the products of local diseases, of which they are a secondary effect, or else upon alterations of the humours arising from a disproportion between the nourishment and the digestive and assimilative powers, the blood being at times too rich in nutritive materials, (inflammatory disposition); at other times, remaining in an imperfect state, (cachectic condition); at others, being surcharged with excremental matters, (atrabiliary disposition); at others again, presenting a lymphatic or scrofulous disposition.

“But with respect to diseases of the nervous system, we must take into account the *relative independence* in which each nerve is found, if we desire to appreciate, at their just value, the consequences resulting from this cause. It is true that all the parts of the nervous system exist in a reciprocal relation, and communicate but too readily their affections to each other, but it is a fact derived from experience, that general nervous disorders are, for the most part, but

irradiations, which have a circumscribed focus, whence they originate, and that the true and essential affection is very often restricted to a little point of this system, where it may remain hidden for a long time without betraying itself by any symptoms, which is proved by the instances of epilepsy arising from a tumour, in which a nerve is implicated, or convulsions produced by extravasation in the brain, or by a tumour near the spinal column.

“The diagnosis and treatment of local diseases is, however, more difficult, inasmuch as the seat of the evil is not necessarily in the part of which the function is most seriously disturbed. Its origin is, in most cases, not in the organ which suffers most, but in a distant part.”\*

Instances enough will have been adduced to indicate that in chronic diseases more especially, our attention should not be too exclusively restricted to the most prominent symptoms, but that these should be traced to their origin, which so frequently depends upon an abnormal condition of the blood or of the nervous system, to remedy which, our means of treatment should be chiefly directed. Of these means none are more efficient than mineral waters, which, by their penetrating operation, and the facility with which they are absorbed, combining, according to the laws of affinity, with the substances which are contained in the blood, and causing neutralisations and separations; or by producing a more complete vivification and nutrition, tend most effectually to the end proposed, as will, I think, more fully appear in the sequel.

\* Des eaux minerales naturelles et artificielles, &c.

## CHAPTER II.

## ON MINERAL WATERS IN GENERAL.

MINERAL waters have been variously defined by the standard authors who have treated of these agents. Thus, Osann observes, "All those springs may be termed mineral which, from their peculiar composition, constantly containing fixed and gaseous substances, their unchangeable qualities, peculiar temperature, and mode of action upon the animal organism, are manifestly distinguished from all other kinds of telluric and meteoric waters."

"The appellation of mineral," says Alibert, "may be given to those waters which, in passing through the bowels of the earth, become charged with heterogeneous matters, so that their sensible qualities remain perceptibly altered, as evidenced by their colour, odour, taste, and specific gravity."

Some, however, would scarcely come under this definition. Pliny formerly observed, "*Tales sunt aquæ qualis terra per quam fluunt*," which is applicable to waters in general; whereas, the most efficient springs derive their mineralising principles from other sources as well as from the soil through which they percolate before coming to the surface.

The distinguished chemist Berzelius remarks, respecting the origin of mineral waters "The water of springs, in passing through the crevices of mountains, and filtering through the earth, dissolves a quantity of substances, which alter their purity when they come to the surface; these substances are silex, various

salts and acids, and even extractive matter, with which the water becomes charged on passing through the vegetable stratum of earth which forms the crust of the globe. It is not yet known in what manner the water becomes impregnated with these substances, for many springs contain some of them in so great abundance, that it would be impossible to procure them from the surrounding soil. Thus, for instance, there flows, annually, with the water of Carlsbad, 746,884 pounds of carbonate of soda, and 1,132,923 pounds of sulphate of soda, without reckoning the other substances which accompany these two salts. It is probable that these waters filtrate through mountains, the substance of which they gradually decompose and dissolve, thus causing a chemical operation, of which the result is to saturate them, and the quantity of which is sometimes so considerable, that art could with difficulty imitate a similar solution. This is the reason why the quantity of substances contained in these waters, varies according to circumstances, and also why these springs must, after a certain period—several centuries perhaps—change their nature according as the soluble substances have altogether disappeared, or on the contrary, as there is still more to be dissolved.” (On Chemistry).

As regards cold springs, their origin is derived from the water of the atmosphere. “Part of the water,” further remarks Berzelius, “which is collected upon the mountains, flows down their sides and forms streams, part also falls into their crevices and penetrates to great depths. In mines more especially this origin of springs is clearly seen. The mountains are inwardly filled from fissures, whence the water flows into the cavities, and the quantity increases in proportion to the depth, so that it is requisite to keep machines for pumping out the water from the mines.”

That mineral springs have a similar origin to others is proved by the observations of M. D’Arcet, at Vichy, and of chemists at other springs, who have found pure

atmospheric air in them, as in snow and rain-water. After a long period of drought also, the quantity of water yielded by certain springs, is less than in rainy seasons, and the mineralising principles are in a more concentrated state.

Mineral waters are, for the most part, clear, their odour and taste depending upon the predominant ingredients. When seen in the reservoirs, they are more or less tranquil, according to proportion of gas; very gaseous springs, and those which, though containing less gas, are of a high temperature, resemble water in a state of ebullition. In some instances, from these causes, the water is projected to a great height in jets or shocks. The Geyser, in Iceland, forms a column ten feet in circumference, the water being thrown to the height of more than 100 feet, accompanied with considerable noise. The water of the Carlsbad Sprudel is likewise propelled in jets or shocks, to a height of three or four feet. One of the most inexplicable phenomena connected with mineral springs, is the alternate rising or sinking of the mass of water at regular periods, as seen at the salt spring near Kissingen, which rises and sinks, in the space of a few hours, from twelve to eighteen feet, the movement being accompanied by a hollow rumbling noise. When the water has attained its lowest point, it again gradually rises to its accustomed level; of late years the average rise and fall has varied from six to nine times within the twenty-four hours, the actual sinking and rising occupying three quarters of an hour.

The specific gravity of mineral waters need not be dwelt upon, being of no importance in a practical point of view, and as the difference between them and common water is so trifling, except in the more strongly impregnated cold waters, as Pullna, &c. Even the specific gravity of so strong a solution as sea water is not more than three per cent. above common water. Some mineral springs have on the other hand a less specific gravity than common water on account of their greater purity.

The degree of temperature of mineral springs is however a point of the greatest importance, both as regards the composition, and intimate admixture of the ingredients and their remedial action. Various explanations have been offered respecting the heat of thermal waters. The most generally received is that which ascribes its cause to the central heat of the globe. "M. Dubuisson," says Alibert, in his excellent *Treatise on Geognosy*, "adduces a great many observations respecting the temperature of mines which prove that the more we penetrate into the interior of the earth, the greater does the heat become. He states that waters which percolate at various depths have the same temperature as the surrounding soil. If these waters in their passage to the surface traverse strata which are bad conductors of heat, they would certainly possess a superior temperature to that of the circumambient air, and would be regarded as thermal waters. It is therefore most probable that those springs which have a temperature of  $50^{\circ}$ ,  $60^{\circ}$ , or more, arise from considerable depths. These observations have been made in Europe by different geologists, and in America by M. de Humboldt."\*

Observations made upon artesian wells have greatly elucidated this phenomenon. It has been long known that the thermometer rises in the exact proportion of a degree (centigrade) to every thirty-two metres, on descending deeper into the earth. Hence was deduced the probable conclusion that the temperature of the globe must be very high at its centre, and more than sufficient to dissolve the hardest rocks. Iron, for instance, which is so difficult to liquefy, is fusible at 12,000 pyrometrical degrees; and copper, which is next to iron as regards hardness, is liquefied at  $253^{\circ}$  of heat.† According to the investigations of MM. Arago and Walferdin, the thermal current which traverses the basin of Paris, and which rises to the sur-

\* *Precis historique des Eaux minerales.*

† *Annales de Thérapeutique.*

face of the well of Grenelle, has its origin of infiltration at a distance of from thirty to forty leagues, and at a height of about 100 metres above the soil of Grenelle. It is the same which supplies the artesian wells of Elbeuf, Tours, and Rouen. This current is in fact a subterranean river, as M. Arago calls it. Notwithstanding these springs come from the same source, it is easy to perceive how their temperature may vary, according to the depth to which boring has been requisite in each locality.

“Hence it follows: 1st. That the same reservoir may furnish a soft cold water in certain localities and a minero-thermal water in others, according to the depth and the nature of the soil which it traverses to reach the surface. 2nd. That being once mineralized the water may present in different points of its course chemical differences according to the different strata through which it passes. Such, for instance, is the case with the Vichy water, which must originate from the same source as that of Hauterive, but which, taking a different course, becomes laden with earthy matters which the latter does not contain. The water is, therefore, purer at the last-named place. This is also the case with the waters of Bareges, St. Sauveur, and Cauterets, which to all appearance arise from the same reservoir. 3rdly. That the higher the temperature of a water the more deep must be its source, unless it derives part of its heat from the proximity of a volcano.”\*

Hot springs have in many instances a manifest connexion with volcanic action, which tends to confirm the above opinion. They usually rise in valleys or mountain localities, and often where there are traces of extinct volcanoes, as for instance at Aix-la-Chapelle, the Pyrennean springs, Vichy and Ischia. “Can it be laid down as a law,” inquires Dr. Gairdner, “that thermal waters will not be found in extensive plains remote from mountain ridges? Observation

\* *Annales de Thérapeutique.*

would seem rather to answer the question in the affirmative as far as Europe is concerned. In the basin extending from the northern base of the Alps to the mountains of Bohemia and Franconia, and from the Riesengebirge on the east to the Black Forest on the west, no thermal waters whatever exist, and very few mineral springs of any description. The mineral waters of the north of Germany consist merely of a few cold chalybeate brine and sulphurous springs. Italy is remarkable for the number of its thermal, acidulous, and sulphurous waters, and in many situations carbonic acid and sulphuretted hydrogen are discharged from the bowels of the earth uncombined with water at all. They almost all emerge from the valleys at the foot of the different mountain ridges. We have already seen the position of the numerous sulphurous springs of Piedmont, and the same general character continues to prevail in the springs of Lombardy, as also in the Apennines. Another remarkable fact is that in the prolongation southwards of the Italian peninsula, all its mineral waters are met with on the Mediterranean side of the Apennines, none on the Adriatic, a phenomenon which we shall afterwards see to be intimately connected with the position of the volcanoes and other manifestations of subterranean fire in this country. The whole north of Russia presents a remarkable deficiency of mineral waters, but the southern parts of this great empire contain a considerable number."

"One of the most curious circumstances connected with the history of thermal waters is the intimate sympathy which is observed between them and earthquakes in parts of the earth remote from each other. It has been formerly remarked that great heat, or excessive cold, long drought or abundant rains, influence very little the composition of thermal waters, however notable may be their effects on some classes of cold mineral waters. Earthquakes have been remarked to produce the most striking changes to which they

are subject in situations remote from the actual scene of volcanic operation. During the prevalence of these distant convulsions their flow has been sometimes much increased, but more frequently diminished or dried up altogether, their impregnation has been materially changed in quantity or quality. All these changes have been either nearly instantaneous; they have continued for a few hours, days, or weeks, at the termination of which the spring has resumed its former course, temperature, and qualities, or there has been a continued permanent alteration of its constitution. The following are a few of the instances on record. On the 2nd July, 1805, during an earthquake at Iserina near Naples, the Carlsbad waters disappeared for several hours. In Sept. 1809, without any visible cause, the Sprudel, Theresienbrunnen, Neubrunnen, and Schlossbrunnen, suffered remarkable changes. The last disappeared altogether, and only appeared again in 1823, but of a very different temperature. But the most remarkable of these changes were those observed to take place in different thermals in Europe during the memorable earthquake of Lisbon, the 1st November, 1755. The source de la Reine, at Bagnères de Luchon, acquired a sudden augmentation of temperature; at Bagnères de Bigorre the heat of the water was for a moment suspended; the same was observed to take place after the earthquake of 1668. On the 1st November, 1755, the same remark was made on the waters of Aix in Savoy. Between eleven and twelve (noon) of the same day, the principal spring of Teplitz began to appear disturbed, flowed for some minutes of a dirty yellow colour, disappeared entirely for a few minutes, and reappeared with such violence that all the basins overflowed. In about half an hour the water was as limpid as before. Analogous changes took place in the waters of Buda in Hungary.\*

As a proof of the frequent connexion of thermal

\* On mineral and thermal springs.

springs with active or extinct volcanoes, M. Rognetta states that the department of Auvergne, which is a highly volcanic district, contains more mineral springs than the rest of France; and he quotes Berzelius, who observes, "Hot springs sometimes owe their heat to volcanoes, or if they are not near volcanic mountains, they seem to derive it from ancient volcanic masses which have not become cold, and of which the superior outlets have been destroyed by the subsequent revolutions of the globe, in consequence of which there have remained only masses of basalt, pumice stone, and lava."

"There are two kinds of warm springs, some which appear to depend upon volcanic phenomena, and which sometimes continue thousands of years after the extinction of the volcanoes; they are rich in carbonic acid gas, and in muriate, sulphate, and carbonate of soda, and likewise sometimes contain sulphuretted hydrogen gas. It is not uncommon for their composition to remain identical even after their heat has descended to the medium temperature of the earth. Others contain muriates of lime and magnesia, but not carbonate of soda, and almost always a small quantity of sulphuretted hydrogen. They are found in places where it is impossible to discover any traces of former volcanoes, so that the circumstance has been explained by saying that they arise from a great depth, their high temperature depending upon the internal heat of the earth, supposing that this increases in proportion to the depth." \*

Dr. Gairdner further observes, with reference to the connexion between hot mineral springs and volcanoes, "It is a remarkable fact that in a very large proportion of waters, and those by far the most important, the ingredients are identically the same with those discharged from the interior of the earth by volcanic eruptions, or found in the fissures of craters

\* The ratio of increase of the earth's temperature in proportion to the depth may be estimated at one degree Fahrenheit for every forty-five feet.

or lava masses in the form of sublimations; such are muriatic acid, sulphur combined with oxygen or hydrogen, carbonic acid, or nitrogen, among the gaseous matters; and among the fixed, muriate of soda, muriate and sulphate of lime, sulphur, iron, &c.; this includes the whole of the great division of thermal waters, whether they rise in the vicinity of active volcanoes, of extinct volcanic products, or of primitive rocks, as also the interesting and important divisions of acidulous and alkaline cold springs. Uniformity and constancy of impregnation are the most characteristic features of this great division, the different members of which are linked together by insensible gradations into one uninterrupted series. A second class derive their mineral ingredients, gaseous and fixed, from an entirely different source; they are mere local products of certain strata holding a comparatively superficial place in the great geognostic series, and vary with the localities where they are produced. They are subject to changes dependent on external influences, whether of temperature, dryness, or moisture, or of secular variations; generally too they are isolated, while the others are disposed in systems, groups, or chains, and are almost invariably cold."

M. Rognetta, who does not regard the above-mentioned as the only source of the heat of thermal springs remarks upon the same point—"The influence of volcanoes in activity upon certain hot mineral springs, seems to be incontestible. M. Boussingault has observed that the gases of springs in the neighbourhood of volcanic mountains, are of the same nature as those which escape from craters (carbonic acid and sulphuretted hydrogen). These waters are generally sulphurous, and greatly acidulated. The soil of Auvergne, which is essentially volcanic, abounds with them, as do Switzerland and Italy, and these springs are always near volcanoes. These coincidences, however, may be admitted without invalidating the general law which we have expressed. It is nevertheless im-

portant to recall to mind that the temperature of most mineral waters has remained invariable for a long succession of ages, which fact accords but little with the explanation of a perpetual half-extinguished volcanic fire. Authentic documents prove that at Bagneres, for instance, the waters have always flowed in the same spot and at the same temperature during two thousand years; this is also the case with the thermal springs of Aquis, in Piedmont, Aix, and several others. There is a general observation which assigns to the volcanic cause a still more exceptional place, viz., that mineral springs are usually situate in valleys and low places.

“The electro-chemical action seems to be still more generally admitted at the present day, though it has been sometimes contested. Several chemists believed that the heat of mineral springs depended upon the decomposition of sulphate of iron. This hypothesis is, however, far from meeting the difficulties which beset the solution of this problem. Are there not, in point of fact, hot springs which neither contain iron, nor sulphur, nor inflammable gas, which must be the case if the contact of the water with iron produced its sensible heat? The celebrated academy of Dijon had already expressed an opinion upon this doctrine. The natural heat of springs, says this body, has been commonly ascribed to the same circumstances which produce the fire of volcanoes, that is to say, to the decomposition of pyrites, and to combustion of bituminous substances, but nothing is certainly known upon the matter. It cannot be denied that in effecting certain reactions in its subterranean passages, water acquires caloric, but on the other hand, there are circumstances where these reactions deprive it of caloric, so that what is gained on the one side, would be lost on the other. Let us suppose the combination of a gas with the fluid, which is the most ordinary case. What then happens? We will quote one of the great masters of chemical science. “This union

is of two kinds; sometimes the water absorbs much more than its own volume of gas, and this loses a large proportion of its caloric, whence it results that the liquid becomes more or less warm. Sometimes the water absorbs only a volume of gas equal to its own, or even less, in which case the caloric of the gas is not set at liberty. In the former instance there is truly a chemical combination between the gas and the water; in the latter we can only perceive a simple mechanical penetration of the gas into the pores of the water into which it insinuates itself little by little as it would do into any other empty space: this is the case with carbonic acid, oxygen, nitrogen, hydrogen, and other gases.

“Hence it is evident that by becoming charged with carbonic acid, waters neither acquire nor lose heat in any notable degree.” (*Annales de Thérapeutique.*)

Some thermal waters are altered by atmospheric variations though only temporarily. After a series of dry weather the action of most waters is more energetic than during the continuance of rainy weather, by which they are rendered weaker.

“It has generally been remarked,” says Alibert, “that gaseous waters bubble more on the approach of storms, without any satisfactory solution having been given of the circumstance. The following is certainly the most correct one, according to the observations of M. Longchamp:—‘The waters of Vichy, for instance, while in the bowels of the earth, contain a great quantity of gas, which could only be held in solution by the aid of a high degree of pressure. In proportion as the water rises the pressure diminishes; and when at length it attains the surface, it is subject only to that of the atmosphere. Thus the gas which was retained only in consequence of a pressure which has ceased escapes, but the water is nevertheless not free from all pressure, since it still supports that of the atmosphere, and consequently retains more or less gas, according as the atmosphere is heavier or

lighter. Thus, at the approach of storms, when the barometer descends, the atmosphere is less heavy and the water retains less gas, and allows a larger quantity to escape than in fair weather, when the weight of the atmospheric volume is greater.'"

The greatest number of mineral springs are cold at a temperature varying from 8° to 15°. The saline and chalybeate ones are not unfrequently materially affected in their composition by atmospheric and telluric changes. Franzensbad, Marienbad, and others, have exhibited different quantities of mineralizing substance, on analysis, at different times. The latter especially has undergone considerable changes, though its remedial properties have not been thereby impaired. The cold purgative waters, Pullna, Saischutz, and Sedlitz, are always much more strongly impregnated during the continuance of dry weather, and are therefore drawn for bottling at the favourable season. Warm and hot springs arising, as has been observed, chiefly in mountain and volcanic districts, present a considerable range of temperature. The following table exhibits the degrees of several of the principal ones in continental Europe:—

	Fahr. Deg.		Fahr. Deg.		Fahr. Deg.
FRANCE.		SWITZERLAND.		GERMANY.	
Eaux Bonnes .	93	Schintznach .	91	Schlangenbad .	86
St. Sauveur .	93	St. Gervais .	113	Wildbad .	95
Mont d'Or .	113	Baden .	115	Aix les Bains .	120
Vichy .	115	Leuk .	124	Teplitz .	121
Barèges .	122			Gastein .	122
Caûterets .	122	ITALY.		Ems .	122
Neris .	124	Monte Catini .	97	Aix la Chapelle .	136
Bagnères de Luchon .	145	Castelamare .	104	Baden-Baden .	140
Plombières .	154	Pisa .	106	Wiesbaden .	158
Bourbonne les Bains .	156	Pozzuoli .	111	Carlsbad .	161
		Aqui .	124	Borcette .	165
		Lucca .	124		

The temperature of the new Geyser (Iceland) is that of boiling water, 212°. England possesses but two which can properly be termed thermal springs, Buxton, 82°; and Bath, 117°.

The relation of cold alkaline and acidulous springs to thermal ones, with reference to position, has been already alluded to. No other writer has so well directed attention to this part of the subject as Dr. Gairdner, whose observations I will again quote. "Another curious fact connected with their position is that, in a great number of situations, there are found in the vicinity of hot springs cold waters strongly impregnated with carbonic acid. In these cases it is observed that the hot waters occupy the lowest point in the valley and river basin, and that the cold springs possessing this peculiar composition are placed at different elevations above them, either issuing from the bottom of the valley higher up the stream, from the declivities of its boundary mountains, or from the very summit or even the reverse of the adjoining chains. Even in the present state of our knowledge this circumstance is perhaps too general or too widely diffused in situations remote from each other to admit of its being ascribed to mere local peculiarities."

"The Sprudel, as is well known, emerges from the bottom of a narrow defile at the exit of the valley of the Tepel. About a quarter of a mile farther up, and at the right bank of the stream, we find the cold acidulous spring which I have formerly noticed. South of Carlsbad, and elevated about one thousand feet above it, are the cold purging waters of Marienbad, also highly charged with carbonic acid. Indeed, from every part of this plateau there issue springs possessing the same character, and carbonic acid is discharged in great quantities uncombined with water from the marshes between Marienbad and Einsiedeln.

"In the Duchy of Nassau, the hot springs of Wiesbaden are placed at the southern base of the Taunus hills, in the valley of the Rhine near the mouth of the river Maine. Farther up the valley of the Maine, we have the cold saline springs of Soden with 88 cubic inches of carbonic acid gas; and at a still higher level the saline springs of Kronberg with 106 inches of this

gas. On the opposite side of the Taunus, in the valley of the Lahn, are the thermal waters of Ems; farther up the river are the acidulous alkaline waters of Geilnau, which contain 163 cubic inches of carbonic acid; of Fachingen, with 134 of acid; and still farther up the Lahn are the celebrated saline acidulous waters of Niederselters, with 108 of carbonic acid.

“Not a single thermal water issues from the elevated plateau of the Taunus interposed between Wiesbaden and Ems, but it furnishes an innumerable quantity of cold mineral waters, almost all of which contain a large dose of carbonic acid, of these the principal is the Weinbrunnen of Schwalbach.

“The hot springs of Bertrich are situate in the narrow valley of the Isbach, near the Moselle, on the southern base of the group of the Eifelgebirge; and those of Aix-la-Chapelle and Borcette occupy an analogous position at its northern extremity. In the intervening space cold springs only are met with, most of which contain a large proportion of carbonic acid. Among these are the acidulous springs of Spa, including La Sauvenière, &c.

“In the valley of the Rhine are the thermals of Baden and Badenweiler. High up, on the adjacent Schwarzwald Mountains, are the cold acidulous springs of Petersthal, of Rippoldsau, with 140 of carbonic acid; of Griesbach, with 75; and of Antogast. A few paces above the hot springs of Mont d'Or, there emerges a cold spring, highly acidulated, which contains the salts usually found in these waters.

“In the Alps almost all the strictly acidulous waters are found in the Grisons, at no great distance from the mountain chain, and in the superior prolongation of a valley in which is situate a thermal water. The hot springs of Pfeffers, in the valley of the Rhine, are at an elevation of 2,128 feet. Farther up are the acidulous waters of Fideris, with 92 cubic inches of gas, and those of St. Bernardino and St. Moritz. To the hot springs of Warmbrunn, in Silesia, belong the

acidulated chalybeates of Liebwerda, with 68 cubic inches of carbonic acid, and of Flinsberg, with 82 inches.\*"

Some bath-physicians have endeavoured to show that the caloric in mineral springs has a character *sui generis* differing from that of ordinary heat, on account of hot mineral waters being longer in cooling than water artificially heated up to the same point, of their capability of restoring half-dead flowers placed in them, &c. Any saline solution would, however, be longer in cooling than common water, if both were artificially heated up to the same point, and would probably have equally the effect of restoring flowers, &c. The experiments of MM. Longchamp and Anglada have fully demonstrated that there is nothing in the heat of a thermal spring that can be considered as forming an exception to the ordinary laws of caloric, though Kastner believed he had ascertained the contrary from some experiments with the Wiesbaden water. The former of these gentlemen, who was commissioned to report to the Academie des Sciences upon this point, says, "Thus the striking conformity of these results no longer leaves any doubt that the

\* "Principal grounds of resemblance between thermal and acidulous or alkaline springs.

"1. In the constancy of their phenomena, and their independence of changes in the atmospheric temperature, dryness, or moisture.

"2. In their composition, the salts of soda predominating, the earths and oxide of iron occurring in comparatively small quantity.

"3. They frequently issue from active volcanoes and true volcanic rocks.

"4. In situations remote from volcanoes they frequently accompany thermal waters, when it is not unusual for them to occupy a higher level.

"5. They are frequently disposed in linear series, or grouped around the mountain ranges or rocky eminences of a country.

"6. They are sometimes found at the junction of two distinct rock formations.

"7. The geognostic structure of their environs is very similar to that of some thermal waters.

"8. They are not found in the midst of extensive plains, unless when these are interrupted by eminences of basalt or other independent rocks."

opinion of the particular nature of the caloric of thermal springs, and of their power of retaining heat for a longer period than ordinary water is a mistake."

Osann, however, inclines to the opinion, that although there be no perceptible difference between the heat of mineral and artificial springs by the test of the thermometer, yet that the former being of telluric or volcanic origin, may produce a different effect on the human body from the latter; and he observes, "There are several hot springs which contain but an insignificant quantity of mineralizing substance, but which are well known to have a powerful action which has not yet been satisfactorily accounted for, and as it cannot be the small amount of substance, it must be by means of a particular action of telluric heat that effects are occasioned which could not be produced by heated distilled water. Such slightly mineralized springs are often distinguished by a specific action on particular organs, and by a special vivifying healing power which many other springs, rich in solid and gaseous constituents, do not possess. This power is not merely experienced when patients bathe in the public baths or piscinæ, in which there is a continual flow of fresh thermal water which Struve considered to be the cause of their action, but also in the private baths, where this renewed supply of water is absent. Neither does it depend upon persons remaining a long time in the bath. As the position of some of these baths is high, some physicians (Vetter, Schwartze) have ascribed their effects principally to the locality, the exciting property of the mountain air, the diminished atmospheric pressure upon the surface of the body. Though these circumstances are of great importance, the action of the baths must not be ascribed solely to them, as others situate in inferior localities, as Schlangenbad and Wildbad, likewise occasion beneficial effects."\*

\* Darstellung der bekannten Heilquellen Europas.

On the other hand, Professor Rust, of Berlin, is said to have obtained from distilled water artificially heated, results very analogous to those of the Gastein baths, making allowance for difference of locality and climate. It very rarely occurs that any peculiar symptoms of reaction are induced by the Schlangenbad baths, unless where there existed previously a great degree of nervous irritability, and Wildbad lies at a considerable height above the level of the sea, though much lower than Gastein. Heyfelder has likewise had occasion to observe the influence of climate, especially of the alpine air, upon the results obtained at some of the Swiss baths, and from the whey-cure, upon the elevated plateau of Geiss, and other establishments. He further observes, that the water of Wiessenberg, in the canton of Berne, exhibits, in point of temperature and chemical composition, much analogy with that of Schlangenbad, and yet the action of these springs is very different. "Wiessenburg, Baden, (Swiss,) Leuk, and Pfeffers, belong to the same class, viz. the more or less slightly mineralized thermal waters; but we should greatly err if we were to expect to obtain similar results from all these baths. Thus Pfeffers does little or nothing when employed against eruptions of the skin; whereas, at the baths of Leuk, obstinate cutaneous diseases are cured. The former of these baths is scarcely 2,100 feet above the sea, in a narrow mountain valley, in which, during the longest day, the sun's rays do not penetrate for more than six hours and a half; whereas Leuk lies 4,500 feet above the sea, in a more open valley, bounded on three sides by a glacier, thick pine forests, and the Gemmi. In such a locality the air must be very different from that of the valley of Pfeffers; more vivifying to all the organs, and especially inducing a new action in the diseased skin." The length of time in which patients remain in the Leuk baths (seven or eight hours daily) is doubtless the

chief reason of their efficacy in cutaneous disorders.\*

As has been stated, the sulphate, muriate, and carbonate of soda are the salts which enter most largely into the composition of mineral waters. Sulphate of soda exists in large quantity in several hot springs, as Carlsbad. In some cold waters it is likewise very abundant; a pint of the Pullna water contains no less than 90 grains; to it the Cheltenham waters owe their action. The sulphate of magnesia predominates in several cold springs which are termed bitter-waters, of which Epsom is an instance. A pint of the Saidschutz water contains near 80 grains of this salt. Sulphate of lime is contained in many springs, especially those of Switzerland, England, and the Pyrennees. The waters of Leuk and Bath contain a large proportion as compared with the quantity of other saline matter. The muriate of soda (common salt) is extremely abundant in many hot and cold springs. Wiesbaden and Borcette are the thermal ones of Germany in which it most abounds; but the quantity contained in the cold salt springs, as at Kreutznach, Kissingen, and other places, is much larger, and the salt yielded by them is a source of revenue to the proprietors. Muriate of lime is also found in several springs, but in small quantity.

Carbonate of soda is the principal ingredient of a large proportion of warm and cold springs, and is generally considered to indicate their volcanic origin. A pint of Ems water contains 20 grains, 1000 parts of Vichy water contain 38 parts of this salt. Among the cold springs in which it predominates are Bilin, Fachingen, Selters. In many springs, however, the quantity is very small. Carbonates of lime and magnesia also enter into the composition of several springs.

\* In the "Baths of Germany" I have further alluded to this subject when treating of particular baths.

Silex, sulphate and muriate of potass, the phosphates of lime and soda, fluuate of lime, carbonate of strontian, extractive and resinous matters, likewise form fractional parts of the composition of many mineral springs. The presence of an animal or organic substance (*glairine*) in several thermal springs has been adduced in proof of their vital property, and is supposed by many to have great influence as regards their effects on the human body. "The existence of organic parts, (infusoria,) their intimate combination with the water of many hot springs," says Osann, "is a very remarkable circumstance; and it cannot be denied that many mineral waters have a peculiar animal taste and smell, the cause of which is not to be detected by chemical examination. When near the Carlsbad Sprudel, one might suppose oneself to be close to a kitchen in which meat was boiling." The green slimy substance deposited on the edge of the basin into which the Sprudel flows has been found on microscopic examination to consist, for the most part, of *oscillatoria confervæ*, &c. These, however, are not contained in the water itself; and it has been ascertained that, for their production, the water must not have a temperature of more than 50°. Löwig considered that this is formed by the depositions of mucous substance from the decomposition of animal and vegetable matters, which, under the influence of light and air, gave rise to these organized beings; and that in mineral waters themselves there is no *organic* matter. The *glairine*, or baregine, is however perceptible only in a few springs, and has probably but little influence on their action, as those which do not contain it are likewise extremely efficacious in many diseases; and even the artificially made Carlsbad produces effects very analogous to the natural water.

## CHAPTER III.

## EMPLOYMENT OF MINERAL WATERS.

THE employment of mineral springs dates from the highest antiquity, and in all countries they seem to have been resorted to for the relief of disease, especially by the peasantry and poorer classes residing near them; and some diseased animals have been observed to have recourse to them spontaneously, to which circumstance the discovery of several efficacious springs is said to be owing. "The history of the inclosure of several German springs," says Dr. Vetter, "and the interest which princes have always taken in them, teach us how highly they were estimated in a hygienic and remedial point of view. The Emperor Charlemagne, at Aix-la-Chapelle and Pyrmont; Duke Eberard, at Wildbad; Adolph of Nassau, at Wiesbaden; the Archduke Frederick, at Gastein; the Emperor Charles the Fourth, at Carlsbad, protected these springs, and encouraged their use. In Spain, during the seven hundred years' domination of the Moors, mineral baths and springs were in higher repute than even in Germany. The soil of this degraded land is still strewn with remains of the magnificent structures which the Romans and the Moors created.

"Works were published treating of the waters, at the close of the 15th century; their number greatly increased in the following years, so that in the course of the 16th century descriptions of the best known baths of Italy, France, and Germany had

appeared, though many erroneous ideas prevailed in them from the imperfect state of chemistry and the deficiency of good analyses, whence the effects of the waters were often ascribed by the people to a wonderful or divine agency. Those most in repute at the present day were then pretty generally known, especially the alpine thermal springs, St. Maurice, Pfeffers, Leuk, and Gastein, as well as Carlsbad, Teplitz, Wiesbaden, the three Badens, and among the cold springs, Pyrmont more especially enjoyed a high reputation." \*

Another foreign writer observes, with respect to the general employment of mineral waters: "It is not only in Europe that mineral waters are in request; nations less advanced in civilization, the Persians, the Chinese, the Indians, the Egyptians, have springs to which they resort for health. How could so many populations, who entertain such various modes of thinking and prejudices, retain but one opinion respecting the use of mineral waters, unless from the incontestible proofs of their therapeutic efficacy. If, notwithstanding these great advantages, mineral waters are not so highly estimated as they ought to be,—if they have been even discredited by some physicians,—it is because so many have allowed themselves to be drawn on by interested enthusiasm, which has led them to see in these waters a remedy for all human infirmities. Mineral waters, however, are not panacea." †

Although more generally employed in former times, mineral waters have not been extensively used in

\* Heilquellenlehre. Dr. Vetter speaks of the English as having borne a prominent part in making known the chemical properties of mineral waters; and mentions the works of Robert Boyle, (1685,) Sibald, Sir J. Floyer, (on mineral springs, and on cold water,) Lister, and Andrew Plummer; and with reference to the imitation of natural waters, Priestly's directions for impregnating water with fixed air, (1772,) and Magellan's pamphlet, published a few years later, "A Description of a Glass Apparatus for making Artificial Waters."

† Patissier, Manuel des Eaux Minerales.

England, with some exceptions, till within the last few years, many persons being sceptical as to their powers, which may partly depend upon the comparatively small number of waters, especially thermal ones, in England, and partly upon the custom of having recourse to active medicines, which stimulate particular organs, (more prevalent here than in any other country,) which renders many persons unable to conceive that the *modus operandi* of mineral waters in chronic diseases must, in order to produce a lasting benefit, differ from that of pharmaceutical preparations, the action of the former being general and alterative, their sensible effects being subordinate and often not apparent till the water has been used for some time. "Mineral waters," says Dr. Kreysig, "become mixed with the mass of humours, produce in them a specific action, and leave the body in a modified condition; they often produce effects independently of any increase of secretion—such are chalybeate waters; but in general an increase in the intestinal canal or cutaneous secretions accompanies their action. We should be, however, greatly in error if these secretions were to be considered as critical in all cases, and as the sole or even the principal effects of the waters, for they are frequently of very subordinate importance; they constitute the most superficial, though the most apparent and quickest effect. The Carlsbad waters very frequently cure the most obstinate swellings of the glands and of the viscera, without any notable evacuations. The cures of these deep-seated visceral enlargements do not certainly depend upon the purgative action of the water, for these cures would not be effected by the prolonged use of purgative remedies. The cure is often preceded by a state of indisposition and an arrest of the evacuations, which is a sign by which one recognizes the saturation of the mass of humours by the water." \*

\* Des Eaux Minerales, Naturelles et Artificielles.

English patients, however, who have become accustomed to the speedy action of pharmaceutical preparations, are with difficulty induced to go through a proper course of mineral waters, and on finding no material alteration in their state at the end of a few days not unfrequently abruptly break off, and report that they used such or such waters without finding themselves a bit the better; others, though they may have regularly used the waters for a longer period, yet acting upon their own responsibility, or without being attended by a properly qualified professional adviser to superintend their course, and to make such alterations as circumstances may require, frequently adopt improper methods of employing it, and are disappointed in the result, while it may be that the blame rests entirely with themselves. Other persons again, though perhaps employing the waters in a proper manner, are yet so much under the influence of habit, that they do not make the requisite alterations in their diet and mode of living, but pursue the same system which very probably tended to produce and to keep up their disorder. A German writer has said, "Whoever comes to a bath to be cured, must desire it in earnest;" and consequently it behoves every invalid who wishes to give a mineral spring a fair chance to bear constantly in mind the object which has brought him to it, without being led to act improperly from the influence of habit or bad example.

Some persons, however, ascribe the benefit from a visit to a mineral spring, entirely to the journey, the mental relaxation and freedom from the cares of avocation, the exercise in the open air, &c. That many invalids would derive great advantage from the mere change of air, scene, and mode of life, is unquestionable; and it is equally true that without these important auxiliaries, the beneficial effects would not be produced in many instances; yet there is no doubt that, in the majority of cases, the benefit

is mainly to be attributed to the medicinal operation of the water, which, though slow, and often not productive of immediate and active effects, is, on that very account, more suited to the class of chronic complaints, in which mineral waters are usually employed. It must also be borne in mind, that in several of the worst cases, in those who resort to mineral springs for relief, these auxiliary circumstances can have no influence, and the benefit obtained is clearly to be ascribed to the waters alone. Many persons are unable to take exercise, care little about the beauties of scenery, take no interest in public amusements, soon become tired, and experience discomfort at being separated from their homes and friends, and are induced to subject themselves to the inconveniences of a long journey to a mineral spring, by the expectation of the benefit which they know they are likely to derive from it. How many persons have I not known crippled and almost confined to their room, suffering from pain, without society or resources for amusement, whose spirits have been greatly depressed on account of their condition, and the inconvenience of a residence in a crowded hotel or bath-house, and notwithstanding, a short time after using the baths have experienced a sensible amelioration, and have ultimately recovered, though they had previously tried other means of relief without success. These are the cases by which the powers of mineral waters may be satisfactorily tested. Many persons, again, engaged in business, soon experience at a bath the influence of ennui, are disinclined to form new acquaintances, and are anxious respecting the course of their affairs, and yet are induced to prolong their stay from the evident improvement in their health during the course, though perhaps little or no alteration is made in their ordinary time of rising, or in their diet. Such persons, where a course of bathing is not required, will often derive as much benefit from drinking an artificial

mineral water, which may also be recommended as an efficient substitute, when a person cannot undertake a long journey, or if he reside near an establishment of mineral waters, and is desirous not to absent himself from his family and his avocations.

Some invalids derive no benefit from one mineral spring, yet are greatly advantaged on using another more suited to the nature of their disease, though the mode of life be the same in both places. Notwithstanding the inferiority of exported waters to those at the springs, they are often eminently serviceable, although the invalids, instead of breathing the pure air of the country, and rising early in the morning to take exercise, continue to breathe the vitiated air of a metropolis, lie in bed during the great part of the morning, and take no exercise except in a carriage; in short, make no change in their usual mode of living. The power of mineral springs is further proved by their prejudicial effects when used in cases to which they are not adapted, and also when incautiously employed by persons in health.

Other examples might be adduced, if it were necessary, to show that mineral waters are powerful means in the removal and mitigation of chronic disease, which require great caution in their administration, and should be employed not as a last resource, and when a disease has become inveterate, as is too often the case; but as therapeutical agents better suited to the treatment of many chronic diseases than pharmaceutical preparations, inasmuch as in these cases active medication frequently does harm, and the good effects of the treatment are generally more durable, in proportion as they are gradually produced.

Many chronic complaints, especially when not of long standing, would be better treated by medicines than by mineral waters, which I by no means wish to be considered as remedies of universal application, and which, in many instances, would be altogether inapplicable: but, on the other hand, there are many

diseases of long duration, in which medicine has been but of little avail, and which a properly directed course of mineral waters would often remove when other means would not succeed. This resource is, however, too frequently delayed till the last, the patient having gone through a whole range of pharmaceutical preparations, and the chances of advantage from mineral waters is much diminished. This, though more generally the case with English invalids, yet not unfrequently occurs with those of other countries, and is a common source of disappointment both to the practitioner and patient. M. Patissier observes on this point, "The patients who go to mineral springs, have often exhausted all the resources of pharmacy, their stomach is weakened by the drugs with which it has been oppressed, and the cessation from this medication is not perhaps the least of the advantages which they derive from a visit to the springs. How many patients are there not who have been given up by physicians, and yet have regained health at mineral springs? How many persons are there not who have recovered the tone and energy from a journey to a watering place, which they had vainly endeavoured to regain by other means? It is chiefly in those states of languor, of exhaustion, of wearying pains, which affects parts without constituting a distinct disease—it is in those obscure anormal conditions, the fruits of a too-refined civilization, which are often only aggravated by medicines—that mineral waters are most advantageous, by exciting a favourable reaction in the organism. So far from being inert, as some suppose, mineral waters are at times so active that we are obliged to moderate their energy by mixing them with milk, or some emollient fluid."\*

On the other hand, there are many people who are far from regarding mineral waters as substances pos-

\* Patissier et Boutron-Charlard, *Manuel des Eaux Minerales*. Paris, 2nd edition.

sessing but little remedial efficacy, are apt to entertain wrong notions of their powers, and frequently use them in cases to which they are little adapted; or, trusting entirely to them, neglect to make the necessary alteration in their habits and regimen, and to adopt other means of promoting their efficacy. Under such circumstances, it is not surprising that disappointment should ensue, and that these persons should frequently leave watering-places in a worse state of health than on their arrival. Dr. Casper remarks on this point, "The first and most important circumstance observable on visiting several baths, is the presence of a considerable quantity of invalids, who are sent to mineral springs upon improper indications, and even sometimes notwithstanding the existence of decided counter-indications, and the complaints of these unfortunate people are not unfrequently aggravated. Oh! that people would constantly bear in mind that mineral waters are among the most powerful means of healing, and that they not unfrequently do more harm than good; that the improper employment of the most dangerous agents, as mercury, for instance, very, very often does not occasion so much harm as a course of mineral waters, such as Carlsbad, Pyrmont, &c., when not indicated."†

Dr. Von Ammon likewise says on the same subject, "Patients go to Teplitz to be cured, who should have gone to Carlsbad; and invalids who can scarcely bear the mildest springs of Ems, are sent to drink the Sprudel at Carlsbad. If all the bath-doctors who perceive these errors committed by physicians, were but honest enough, on the arrival of patients, to send them away, and dissuade them from the use of a water which may do them more harm than good! but honesty and policy do not always go together."\*

\* Wochenschrift der gesammte Heilkunde, August, 1838.

† Brunnen-Diatatik.

A course of mineral waters, or cure, as it is termed in Germany, generally lasts from four to six weeks; in many cases, however, a shorter, as from two to three weeks, is recommended. In other instances a much longer course is required, or even two courses during the season, two or three weeks intervening between them. During this period, patients for the most part drink the water daily; the quantity being gradually increased according to circumstances, and towards the termination of the course gradually decreased. The water should always be drunk early in the morning at the spring, when possible, gentle walking exercise being taken at the time. In some instances it is diluted with milk, or some other simple fluid. It is also advisable in many cases to drink a little of the water in the afternoon. As other medicines mostly interfere with the operation of mineral waters, they should be abstained from, unless recommended by the physician. When bathing is exclusively recommended, or when the bath is combined with the internal use of the water, it is usually taken daily in the forenoon at a temperature between 86° and 98°: the cold waters being artificially heated to the proper degree. The details of these matters are, however, regulated by the resident physician at the baths, whom the patient consults, and without whose advice no one should commence the use of mineral springs.

Baths of mineral water have a two-fold action; in the first place, from the prolonged and repeated contact of warm water impregnated with saline and gaseous substances; its texture is softened, the activity of its capillary circulation is increased, as well as that of its secretions, perspiration being not unfrequently produced; and consequently the blood is drawn in greater quantity from internal parts, thus relieving states of visceral congestion. When tepid, they have also a sedative action on the nervous system, the pulse becomes slower while the person is in the bath, and a tendency to sleep frequently super-

venes. These effects, though in a less degree, are also produced by baths of common water; but a prolonged course of bathing in warm water would greatly relax and debilitate; whereas, when baths of mineral waters agree, persons feel refreshed and strengthened by their use. The second and more important operation of baths of mineral water takes place by means of the absorption of a portion of the water, which becomes mixed with the blood, and thus has a material effect in altering the quality of this fluid and that of the secretions. It has been proved by the experiments of M. D'Arcy and others, that a single bath in the Vichy water suffices to render the urine alkaline. The tonic effects which result from baths of a chalybeate water are manifested in many instances, where persons are unable to take the water.

The period of remaining in the bath varies from a quarter of an hour to an hour, or even longer. At some of the French and Swiss baths, which are slightly mineralized, and have not a high temperature, patients pass four, six, or eight hours a day in the water, having floating tables to hold books, &c. Unpleasant symptoms are not unfrequently produced from the baths being taken at too high a temperature, or from the patient's being in too excited a state when he begins to bathe. The symptoms from these causes must not be confounded with those of a similar nature which occur after the baths have been used some time, and which indicate that the system is becoming saturated. Persons who bathe daily should pay proper attention to their clothing, which should be light, and at the same time sufficiently warm, as the skin is more liable to be affected by atmospheric vicissitudes, and the difference of the temperature between the localities of many baths and that of the surrounding country is frequently very great. Those, especially, who are passively carried through the air on horseback, or in a carriage, should take an extra garment with them in the event of their feeling chilled.

Douching, or the directing a stream of water upon a part, is most frequently performed while the patient is in the bath. Douches are of various kinds, as the descending, the lateral, and the ascending: the water in the first kind falling from a reservoir, at a greater or less height, upon the patient in a single or divided stream, the size of which may be varied according to circumstances. The lateral douche is produced by a man's pressing the water through a tube, as with a fire engine, the stream being directed against any part of the body that is indicated. The strength of this can be regulated by the attendants pumping with a greater or less degree of force, and also by a finger placed over the aperture, by which the stream is divided. In the ascending douche, the column of water is directed upwards, and is usually taken in a sitting posture; this douche being almost exclusively employed in complaints of the organs contained within the pelvis.

Douches are directly exciting remedies, and are mostly used to produce a greater degree of vitality and activity in parts, as in cases of local debility, scrofulous swelling, muscular rigidity, paralysis, contracted joints, neuralgic pains, &c. They are mostly administered while the patient is in the bath, and are often advantageously combined with friction. The employment of the douche requires to be carefully superintended.

In some cases, preparatory measures are requisite before commencing a course of mineral waters, which otherwise would be likely to disagree; as when there exists a state of constipation, plethora, or disorder of the digestive organs, nervous and vascular irritability, these complications may frequently be removed or mitigated by appropriate means, which will materially promote the subsequent beneficial effects of the course. This is more particularly necessary to be attended to when a course of the more strongly mineralised and exciting waters, as Wiesbaden or Carlsbad, is indi-

cated. It likewise not unfrequently happens, that what is called an *after cure*, by a different kind of mineral water or of other means, is required. Thus, to relieve the state of relaxation and oppression which these and other springs sometimes occasion, the subsequent employment of a cold saline or chalybeate is advisable. Patients, after having undergone a course of Wiesbaden or Ems, are often sent to Schwalbach, or Schlangenbad, to use those waters; and after a course at Carlsbad, to Marienbad, Franzensbad, or Teplitz. Much judgment on the part of the physician is required, in order to determine justly when an after-cure should be recommended, as the inconveniences sometimes complained of after the employment of an active spring, are often of very temporary duration, and are the prelude to the occurrence of critical appearances, and of a favourable change, which might be prevented by the exhibition of a water of a totally different character; and even in those cases when a chalybeate, for instance, is indicated after a course of hot saline or alkaline waters, a period of ten days or a fortnight should intervene before the change be made. In many persons the suspension of the course, and change of air for a few days, suffices to remove the oppression which is sometimes induced at an early period, and before the system has become sufficiently saturated with the water. When much excitation persists after the course, it may generally be removed without interfering with the beneficial effects, by bathing in a slightly mineralised thermal water, as Schlangenbad, Chaudefontaine, or the cooler springs of Teplitz. When, on the other hand, relaxation and debility are complained of, the drinking a gaseous water containing a small portion of iron, as the Fachingen; and afterwards a more direct chalybeate, if necessary. It is likewise essential after a course of mineral waters, that invalids should not consider that caution is no longer requisite; many have prevented the good effects of the course, by re-

turning too soon to the worry of affairs, or to an improper regimen, or by hurried travelling homewards.

The mind of an invalid who expects to derive advantage from a course of mineral waters, should be as free as possible from cares and anxieties. Equanimity of temper should be preserved, and gaming, or other occupations which tend to disturb it, should be avoided. He should avail himself of the resources for amusement and facilities of association afforded at watering-places, by which means the beneficial action of the waters will be materially promoted. With regard to diet, I do not think it so essential to draw a distinct line of demarcation between substances that may be taken, and others that are to be avoided, as some writers on mineral waters have done. Certain articles of diet agree very well with some persons which would be prejudicial to others; hence a person's own experience must in some measure guide him in this respect. It is, however, of great importance that the invalid do not err with reference to the quantity of the ingesta, as when the stomach is overloaded with food the whole system is oppressed, and a state of excitement is induced which tends greatly to counteract the beneficial effects of the waters; thus, when the appetite is satisfied, it is manifestly injurious to go on eating, as is frequently done, and especially at dessert, things which are in themselves indigestible, as hard fruits, macarons, &c., which are usually placed upon the table. As a general rule, the articles of diet which will be found best adapted to a person using mineral waters, will be soft fish, plainly dressed, tender roast or boiled meat, poultry or game, well-cooked vegetables, farinaceous puddings, and ripe soft fruits, as strawberries: while on the other hand, pickles, salted or dried meats, and highly-seasoned dishes, raw vegetables, as salads, should be avoided, both on account of their being in themselves prejudicial, and of the appetite being sti-

mulated by them to take more than the stomach can readily digest. Attention to articles of diet is more especially requisite during the employment of waters containing much salts and gas, the action of which tends to increase the abdominal secretions, or to induce crises, as Carlsbad, Marienbad, Kissingen; as also during a course of chalybeate waters. At the above-mentioned and some other places, the dinners are under the superintendence of the authorities—those things likely to disagree not being allowed to be put upon the table, though of course a similar regulation could only be enforced at those baths, which are almost exclusively resorted to by invalids. The best criterion of a dinner not having disagreed is, that the person feel himself light and comfortable afterwards, and not flushed or excited during the afternoon.

Walking exercise is an essential adjuvant to the beneficial action of waters which are taken internally, their operation being thereby not only greatly facilitated, but the exertion further conduces to invigorate the mind and body, both on account of the more numerous calls upon the attention out of doors, and from the activity imparted to the muscular, circulating, and respiratory systems.\*

\* "The movements of the body," says Cabanis, propel outwardly those powers which, during the state of repose, tend almost constantly to become concentrated either in the brain or in the abdominal viscera, and distribute them more equably, establishing and maintaining the equilibrium, accelerating the circulation, exciting the insensible perspiration, and as well as by the increased tone which they impart to the muscular fibre, prevent the prejudicial predominance of the nervous system."—*Rapport du Moral et du Physique de l'Homme*.

## CHAPTER IV.

## CLASSIFICATION AND EFFECTS OF MINERAL WATERS.

AN accurate classification of mineral waters is attended with some difficulty, inasmuch as several cannot be absolutely referred to one division more than to another, on account of the mixed nature of their properties and their different effects in different cases, so that it not unfrequently happens that the same spring is differently classed by different authors. Much confusion may, however, be avoided by adhering to the rule of determining the division to which a spring belongs more by the nature of the peculiar properties by which its action is distinguished, than by the proportionately larger quantity of any particular ingredient which it may contain. Chalybeate waters, for instance, contain but a small proportion of iron in comparison with the quantity of saline substance, and would be placed under a different division were their chemical composition to be exclusively considered. Yet their tonic action on the human body sufficiently points out the class to which they naturally belong. The same may be said of most sulphurous springs. In my former work I have ranked mineral springs, according to their action, under the following heads:—Sulphurous, chalybeate, saline thermal, saline aperient, alkaline, and acidulous; to which may be added salt or brine springs,

and those slightly mineralized, and I will here briefly refer to the leading properties of each.

1. *Sulphurous springs*.—The sulphurous principle is everywhere found in the animal, vegetable, and mineral kingdoms—in our own organization—in the plants which nourish us—and either in a natural state or in the form of sulphuret, in the bowels of the earth—so that sulphurous form, next to saline springs, the most numerous class, and perhaps the most important and efficacious in the treatment of many intractable diseases. There are both hot and cold sulphurous springs, but the best division in a practical point of view is the one made by Mr. Fontan into natural and accidental, the former constituting those which are rendered primitively sulphurous within the earth by the chemical action of the principles which mineralize them; the latter having originally a mineralization of a different kind, but accidentally acquiring a sulphurous impregnation in their passage to the surface.

“Springs of the former division,” says M. Fontan, “are distinct from others, and have but few saline constituents. They contain azotized substance, sometimes in large quantity, and disengage pure azote. Their sulphurous principle is a sulphuret or sulphhydrate of sodium. They are thermal, but in some instances, before coming to the surface, have been cooled, by the addition of other water during their long passage from the original source. The accidental, on the contrary, are originally saline springs, which receive a sulphurous impregnation by passing through organic or vegetable substances in a state of decomposition. They contain a large proportion of soluble salts, calcareous and magnesian, and are generally cold, or if warm, owe their temperature to a neighbouring saline spring. Their sulphurous principle is a sulphuret of calcium or a hydrosulphate of lime.”

Owing to the specific lightness of the sulphuretted

hydrogen gas, it is but slightly combined with the water, on which account these waters do not bear exportation, but should be taken at the source, the more especially, as when they are indicated, baths form the most essential part of the treatment. Sulphur exerts a special action upon the skin, the mucous membranes, and the liver, and in the form of gas, as it usually exists in mineral waters, has a much more penetrating operation than in the form of pharmaceutical preparations. It likewise has a powerful action upon the nervous and lymphatic systems. The operation of these springs varies according to the manner of their exhibition, and to the peculiarities in individual cases. Most of the thermal springs are stimulating, and their use requires much caution and discrimination, especially in weak persons, or those of a nervous temperament, and in those disposed to congestion of the brain or lungs, or to hemorrhagic affections, which would frequently altogether counter-indicate their employment.

M. Rognetta observes, however, that the stimulating properties of sulphurous or other thermal springs depends upon their high temperature. "It is essential to distinguish from the special action of sulphurous waters the accessory element which complicates this action, viz. caloric. Without this precaution we should arrive only at false conclusions, as has been the case up to the present time. It is certain that the primary and immediate action from baths of this water is stimulating, exciting, and even congestive, so as sometimes to produce apoplexy if their temperature is much above that of the body. This stimulation is owing to the caloric, which is absorbed before the water; but as soon as the fluid passes by absorption into the economy its proper dynamic action becomes manifested, and is progressive in proportion as the stay in the bath is prolonged. This second action destroys the first, it is essentially antiphlogistic; it is this, and this alone, which cures diseases having a

basis of excitation; and it is always with affections of this nature that we have to do; for what are rheumatism, white swelling, an ancient catarrh, a chronic cutaneous eruption, a visceral engorgement, paralysis, chronic ulcer, or wound, if not diseases which have an inflammatory or excitatory basis, which are constantly exasperated by positive stimulants, but are, on the contrary, ameliorated by antiphlogistics. If sulphurous waters are exciting, as has been generally supposed, all those diseases would have become worse under their influence." "Do the waters of the Pyrennees," further inquires M. Rognetta, "form an exception to this rule? We believe not; and it is from being under a positive delusion, that all writers who have treated of these waters ascribe to them a stimulating and exciting action. This assertion is in flagrant contradiction with the very facts which have been brought forward in favour of the hypothesis; as, for instance, the re-establishment of secretions from the mucous membranes, and the abundant perspiration which succeed the use of these waters; but this is a false interpretation. It is a known fact that the mucous membranes, with few exceptions, do not become dry or secrete in excess, unless from an irritation or latent sub-inflammation in their texture. Excitants increase this morbid condition; but secretion returns, on the contrary, within its normal limits under the influence of antiphlogistic means, which remove their disordered condition. Even the perspiration which comes on some hours after a bath presupposes a state of relaxation of the glands and capillary vessels of the skin; and impartial clinical observation demonstrates that chronic catarrh, laryngitis, and pneumonitis, are cured under the action of these waters, by the progressive disappearance of their phlogistic condition, which leads to the re-establishment of the normal functions exactly in the same way as bleeding and other antiphlogistic means do in acute inflammation."

Used in the form of bath, the primary action of sulphurous waters is upon the skin, increasing the activity of its capillary circulation and secretion; and upon the absorbent system; these effects upon the mucous membranes and viscera being consequent to their action on the surface of the body; internally taken, they act primarily upon the mucous membrane of the stomach and bowels, or upon those of the air passages or urinary organs according to circumstances, generally exciting the secretion of the bile and the abdominal venous circulation. Thus their sensible operation may be aperient, diaphoretic, diuretic, or expectorant, according to the mode of their exhibition, the constitution and disease of the patient, the nature and quantity of the saline substances which they contain, &c. "The elective action of these waters," says M. Rognetta, "is carried on the one hand towards the peripheric capillary system, and on the other towards certain internal viscera. As respects the former mode of action, sulphurous waters are the remedy *par excellence* for chronic cutaneous, and membranous inflammation; as eruptions, bronchial affections, &c. As regards the latter, they furnish a powerful remedy against certain abdominal diseases. In the first case it is the sulphurous element which acts electively, in the second it is the saline element with an alkaline base, and the combined action of the two forms an energetic means of combating paralysis with a basis of excitation. At Barèges, Caûterets, and other sulphurous springs of France, many surgical diseases, such as swelling of the joints, old ulcers and wounds, suppurating fistulæ, muscular contractions, cicatrices, scrofulous tumours, with or without caries or necrosis, are every year treated by baths, half-baths, vapour baths, water or gas douches, and at the same time by the internal use of the water, by which ameliorations or restorations are effected, the diseased textures become softened and deterged, suppuration diminishes, the parts become covered with healthy

granulation, and foreign bodies, as balls, pieces of bone, &c., which kept up suppuration and fistulæ, become detached, and nature effects the cure."

"Is it possible to see in these phenomena any thing else than a powerful antiphlogistic hyposthenic action, which combats the dynamic morbid element—inflammation—which opposed itself to the reparative process? We hear talk nevertheless of tonicity, of stimulation in the action of these waters, and it is not considered that whatever stimulates and excites only produces a greater tension of fibre, hardens and inflames the textures, and increases the disease."

"What we have said respecting these diseases is equally applicable to the other surgical affections which we have mentioned, a muscular retraction, a painful cicatrix, a coxalgia, &c., are attributable in the present state of science only to a low inflammatory action, and the sulphurous water only effects its cure by destroying a similar morbid condition. If we now pass on to the class of diseases in which these waters have the greatest power, viz., cutaneous diseases, we find a confirmation of the same circumstance in a still more marked manner. Here in fact the antiphlogistic action is very decided in consequence of its elective tendency towards the skin; and if we call to mind that the skin affections, in which these waters produce the best effects, are just those of which the foundation is inflammation or irritation, and which are generally treated with most advantage by antiphlogistic remedies, the correctness of our view of the subject will be perceived."

In cases of chronic exanthema and other cutaneous diseases, and in several rheumatic affections, sulphurous waters will frequently prove more efficacious than any other class of remedies. They are moreover employed with the greatest advantage in some atonic conditions of the circulation, especially of the abdominal venous system, giving rise to hepatic obstruction and piles, in many scrofulous cases and

affections of the mucous membranes, accompanied with increased secretion, such as chronic pulmonary catarrh or disease of the urinary apparatus with discharge. Among the most efficient sulphurous waters are those of Aix-la-Chapelle, Aix-les-Bains, and of the Pyrennees; Harrogate and Weilbach are among the best cold waters of this class.

2. *Chalybeate Springs*.—These are all cold; for though many springs contain iron, those only belong to this division, which, by their manifest tonic properties, clearly indicate the predominance of the iron over the other mineralising ingredients. This depends not so much upon the quantity of the metal, which is generally very small, as upon the proportion of the saline and gaseous elements, their nature and state of combination with it.\* These are the chief circumstances which modify the action of chalybeate waters, and enable persons to take them who would be unable to take the pharmaceutical preparations of iron. Taken internally, waters of this class have a directly fortifying action upon the nerves of the stomach, imparting tone to the whole digestive apparatus, and to the system generally, increasing the muscular power, and improving the quality of the blood, and of various secretions.† Their action in the form of bath is no less efficacious, and in many instances this mode of administration alone suffices to invigorate the body, and improve the state of the blood. They are especially adapted to individuals of torpid and lymphatic temperaments, of weakly and relaxed constitution; to cases of general debility and muscular atony, unattended by morbid alteration of organs, but frequently dependent upon chagrins, and other moral causes, upon diminution of the quantity, or deterioration of the quality of the blood, induced by hemorrhage, long

\* Iron is in several purgative waters merely a corrective, preventing their otherwise too relaxing and weakening action.

† Boerhaave said, "There is a something divine in iron, but none of its artificial preparations are so efficient as the acidulous chalybeate waters.

continued discharges, or acute diseases. Chalybeates are also specially applicable to many cases of impaired energy of the assimilative functions, consequent on excesses or other causes; to hypochondriasis and other disorders of the nervous system, passive hemorrhage, and some catarrhal affections. They are likewise not unfrequently used as an after-cure, subsequent to the employment of other mineral springs. It is well known, however, to practitioners, that in many cases of debility, though apparently arising from no local disease, the exhibition of tonic remedies, even of the lighter kind, is not well borne, in consequence of the extreme susceptibility of the nervous system to impressions of any kind. In other cases, the debility, though the most apparent symptom is not the cause of impaired health, but is superadded to latent alterations in the state of particular organs, which prevent the beneficial action of this class of remedies, and which require for their removal deobstruents or alteratives; some mineral waters combine these two modes of action, the quantity of iron being no more than sufficient to correct the otherwise too solvent and relaxing properties of the saline ingredients, and these are frequently employed with great advantage in cases where direct chalybeates would be prejudicial, until the system has become better prepared for their administration.

On the other hand, tonics and chalybeates are prejudicial in persons of full habit of body, of rigid fibre, with tendency to visceral congestions, active hemorrhage, and inflammatory diseases, in cases of organic change of important internal parts; in dropsy and pregnancy. When they agree they are easily digested, produce a feeling of invigoration, improved appetite and strength, without inducing constipation of the bowels, or symptoms of congestion towards the head or chest.

3. *Saline Thermal Springs.*—Several of the remarks which have been made under the head of sul-

phurous springs are equally applicable to this class. Muriate of soda or common table salt is the ingredient found in greatest abundance in these waters, being generally combined with earthy or alkaline sulphates, carbonates and muriates, small quantities of metals and the animal substance termed glairine, and a certain proportion of carbonic acid gas. The operation of these springs is generally alterative, their power necessarily depending upon the relative proportion and state of combination of the integral parts, their temperature, the condition of individuals, &c. When taken internally, the water does not in general materially increase the secretions of the alimentary canal, but frequently acts upon the kidneys and skin, though often in a manner scarcely perceptible. They are, however, chiefly used in the form of bath, which excites the nervous and vascular systems of the surface, increases the activity of the absorbents, and thus often tends materially to relieve states of visceral congestion, to diminish glandular swellings, and to improve disordered states of the mucous membranes, skin, and fibrous structures. But the more specially alterative action of these and other springs, by which a cure or relief from several diseases is obtained, is by means of the quantity of water which is absorbed into the system from the bath producing changes in the composition of the fluids; hence the necessity of a regular course, which requires superintendence. Saline thermals have a less exciting action than alkaline springs, under equal circumstances of temperature, amount of constituents, &c., which Vetter ascribes to the greater readiness with which alkaline carbonates amalgamate with the animal juices, and affect more powerfully the chief organs of assimilation, the liver and kidneys. These springs are chiefly serviceable in the more chronic forms of gout and rheumatism, paralysis from repeated rheumatic attacks, or from miasmatic influence, some neuralgic affections, dyspepsia, with torpor of the liver, and other conditions of deranged health. The em-

ployment of these springs is counter-indicated in most of the cases in which sulphurous waters are inadmissible. Among the principal ones are Wiesbaden, Bourbonne les Bains, and Borcette.

4. *Saline Aperient Springs*.—This class of mineral springs is distinguished from others, by containing, as a predominating ingredient, sulphate of soda, (Glauber's salt,) or sulphate of magnesia, (Epsom salt,) which sometimes exist in large quantity; the other substances being in comparatively small proportion. Some of these springs are very gaseous, and of a high temperature; others are cold, and contain but little gas. The hot springs are usually energetic in their action, and exciting to the system generally; the cold ones are antiphlogistic, cooling, and have an aperient, purgative, or diuretic operation, according to the quantity taken &c. These usually bear exportation well, and are often useful in cases of vascular plethora, febrile affections, and visceral congestion. Artificially prepared, they are but little inferior in efficacy to the natural waters. As the prolonged action of saline aperient springs is frequently debilitating, their employment requires professional superintendence, and it is occasionally requisite to suspend the course for a short time. Carlsbad is the most efficient of the hot springs; Marienbad, Kissingen, Homburg, Leamington, and Cheltenham, are among the best cold ones. As this class is chiefly employed in the various forms of abdominal congestion and torpor, baths of the water, which would interfere with its internal operation, are not so frequently recommended.

5. *Cold Salt or Brine Springs*,—*Soolquelle*.—These springs are strongly saturated with common salt, which is collected by means of evaporation for exportation, and are likewise frequently employed medicinally in the form of bath. A residence near salt-works or the sea is also beneficial in some diseases, from the impregnation of the air with saline

particles. Dreissen and Meissner found a considerable quantity of free muriatic acid in the atmosphere in the neighbourhood of the salt-mines at Hall, and according to Schmidt, since salt-works have been established at Rosenheim, consumption, which was previously very prevalent, has considerably diminished in frequency.\* Similar results have been observed at Bex and other places. Salt-springs, however, contain other mineralising ingredients, and carbonic acid; some of them possess a considerable quantity of iodine and bromine, the action of which is modified and rendered more energetic by combination with the salts.† These baths powerfully excite the action of the skin and lymphatic system, and consequently promote absorption and give tone to the muscular system, and by absorption alter and improve the state of the blood and secretions: hence they are eminently useful in cases of deficient tone, and torpid vitality of the surface and of the capillary vessels and glands, as witnessed in scrofulous swellings, ulcers, and affections of the bones, and in certain inveterate cutaneous diseases. In chronic rheumatic, and syphilitic cases, these waters frequently render effectual service, as well as where there exists a general delicacy, or constitutional debility, without actual disease. Their internal use excites the secretions of the alimentary canal, sometimes so as to produce purgation, and of the kidneys, and is frequently combined with the baths. Among the most efficient waters of this class, may be enumerated those of Salzhausen, Kreutznach, Kissingen, Heilbronn.

The greater accuracy of chemical analysis in recent

\* Schwartz Heilquellenlehre.

† The experiments of M. Lugol upon the action of iodine, proved that so small a portion as half a grain taken daily in a pint of water, produces the most beneficial effects in some of the worst cases of scrofula, and he seldom prescribed more than one grain a day in twelve ounces of fluid. When therefore it is considered that in a prolonged course of these waters more than this quantity must be daily absorbed into the system, its agency can scarcely be doubted.

times, has demonstrated the presence of iodine, bromine, &c., in springs where it was not suspected, and those above-mentioned contain it in comparatively large quantity; doubtless owing much of their efficacy, in certain cases, to its absorption. It has been questioned whether so small a fractional part of iodine, as compared with the quantity of salts, can be productive of any effects; but several remedies, which have had considerable reputation, as burnt sponge, cod liver oil, &c., of which the active principle is an ioduret or hydriodate of which the effects are well marked, do not contain this substance in greater proportion than would be taken in mineral waters, where, be it remembered, the state of dilution and intimate admixture conduces to its more complete absorption. M. Boujeau, a distinguished chemist in Savoy, drank a quart of the iodated water of Challes in the course of a day, and for seven days subsequently both the urine and saliva showed manifest signs of the presence of iodine, whereas five grains of the iodate of potass which he took in water exhibited traces of iodine in the urine only during twenty-eight hours, and in the saliva only seventeen. The water of Challes, however, does not contain more than one third of a grain of iodated alkali to the quart. "It is doubtless," says M. Rognetta, "to the circumstance of the iodine not becoming absorbed into the system that large doses can be given with impunity. It is only of late years that iodine has been detected in mineral waters. Whenever a mineral water contains a large quantity of muriate of soda, it may contain iodine which generally accompanies this salt, consequently the sea is the type of iodated waters. This is why mineral springs only contain traces of it, for no water contains so much muriate of soda as the sea." The salt or brine springs above mentioned contain salt in a much more concentrated form than the sea, and also more iodine in the same quantity of water.

6. *Alkaline Springs*.—The presence of carbonate

of soda in greater abundance than other salts characterises this class. The carbonates of lime and magnesia, sulphate and muriate of soda, are likewise usually met with though in smaller quantity. Carbonic acid forms a component part of alkaline springs, though in some the quantity is very small. Taken internally, these waters affect principally the mucous membranes of the stomach and bowels, of the urinary apparatus and air-passages, altering the quality of the secretions, and acting most frequently upon the skin or kidneys, rarely upon the bowels, though their sensible operation is frequently not experienced at the time. Used in the form of bath, those which are strongly impregnated and of high temperature have a stimulating action,—more so indeed than saline springs possessing the same proportion of ingredients, though, as before shown, this may depend chiefly upon the heat. Those which are less mineralised have usually a sedative effect upon the nervous system, allaying irritation, slightly increasing the action of the cutaneous capillary vessels and of the absorbents, frequently imparting softness and clearness to the skin, and affecting in a secondary manner internal organs. The absorption of the water, when the system has been for some time subjected to its action, produces alterations in the state of the fluids, which determine the cure of several diseases, especially of the fibrous textures, and of the glandular system. The hot springs, which are rich in saline substance, are more especially indicated in atonic states of the constitution, and where there is a deficiency of cutaneous secretion. Those, on the other hand, which contain a small proportion of saline and gaseous matter, are, from their more sedative and less exciting operation, preferable for delicate or weak persons, in cases attended with increased muscular excitement, or irritability of the nervous system. Where, however, there exists either great debility of the system, organic change of the lungs, or other important parts,—a

state of general plethora, a tendency to apoplexy or to dropsy,—these, as well as most other mineral waters, are counter-indicated. The cases in which this class of waters may be employed with advantage are, stomach derangement, with acidity and deficient biliary secretion—gouty complaints, especially of the nervous kind, or in irritable subjects, and complicated with some stomach derangement,—some diseases of the urinary organs, when not attended with obvious inflammatory action; the tendency to the formation of gravel and stone; laryngeal and bronchial hypersecretion, scrofula, impaired uterine functions, many nervous disorders, and some cutaneous diseases.\* Among the most celebrated thermal alkaline springs, are Vichy, Ems, Teplitz. The cold springs, which also contain a large quantity of gas, are exclusively used internally. Bilin, Fachingen, and Selters, are the most efficient among them.

7. *Acidulous Springs*.—Some writers on mineral waters place under this head all those springs which contain a large proportion of free carbonic acid, and the two last-named might, without impropriety, be considered as such, but for the large quantity of saline constituents which they possess. The action of the Seltzer water especially, has great analogy with the more purely acidulous waters, and is not unfrequently employed in similar cases. These waters are cold, sparkling, and effervescing; of a sharp, piquant, agreeable taste, but soon lose their properties by being exposed to the atmosphere; their operation is cooling, refreshing, and at the same time exhilarating, gently exciting the nerves of the alimentary canal, altering the quality of the secretions of the alimentary canal and kidneys, and diminishing the too copious formation of mucus from the membranes lining the digestive, urinary, and air-passages. These waters are very commonly

\* A course of alkaline baths is said to diminish obesity. Dr. Petit has observed this effect at Vichy.

taken pure, or mixed with wine, as an ordinary summer beverage, and they are occasionally exhibited in febrile and sub-inflammatory complaints. They sometimes, however, prove too exciting, producing headache, heaviness, confusion of ideas, with general agitation and sleeplessness, but in general they are highly useful in many cases of dyspepsia, nervous affections, with the character of relaxation or torpor, in pulmonary complaints, and some diseases of the urinary organs. They are seldom used externally, though they afford the means of supplying gas-baths and douches, of which mention has already been made. The Maxbrunnen at Kissingen is a good specimen of this class.

8. *Slightly mineralised Springs*—or, as some German writers have called them, chemically-indifferent springs, are for the most part thermal, though some, especially in England, are scarcely tepid, and are chiefly used in the form of bath. Some allusion has already been made to the circumstances which determine the powerful effects frequently observed from these springs. That the high temperature is a chief cause of this, there can be no doubt. "It is," says Vetter, "the excitation of the surface, the expansive powers of the heat, the soft, gentle pressure, the purity and solvent power of the waters, which produce the effects: it is only in some cases that the peculiar action of the mineralising substances is to be considered. Hence the difference of temperature forms a great and important difference. A cool Gastein water, used in the same way as the hot spring, would produce but few of the effects of the latter; and what would Schlangenbad, Warmbrunn, or any similar springs do for patients if they were cool? But in the strongly-mineralised waters, (saline springs, &c.,) there is a something more than the heat which has a curative property."

Some slightly mineralised springs, and of a comparatively low temperature, do, however, sometimes in-

fluence peculiar symptoms, especially when used in the form of bath. This I have had occasion to observe at Schlangenbad. The internal use of the Malvern water is in some instances attended with nausea, drowsiness, vertigo, and headache, which Dr. Wall ascribed to the great facility and rapidity with which a liquid in a state of so great purity enters the absorbent system, and thus induces a temporary plethora. Dr. Vetter likewise observes on this point, "The more a water approaches a state of chemical purity, so much the greater is its latent warmth; hence slightly mineralised baths are more exciting than those of common warm water. The purer a water is, so much the greater is its solvent powers: it is more easily absorbed, excites the vascular system more, and causes increased vital activity, a greater degree of feverish reaction and crises in the secreting organs. This circumstance is of importance where there is a preponderance of earthy matter in the system, a want of power, with alteration of the solid substance in all the textures of the body, with their consequences, viz. obstructions and a threatening of depositions in these textures in persons who have a torpid circulation; for it appears to be an axiom with respect to the organisation, that in proportion to the density of the textures the smaller is the number of their vessels, and the more limited is their movement. Hence waters of this class are suited to old age, and possess a renovating power, by imparting fresh flexibility and mobility to the muscular system, and strengthening the nerves, as may be observed in those cases where stiffness prevails, united with general weakness and local irritation." \*

The therapeutical action of a spring is not always

\* The difference of solid substances contained in mineral springs will be seen from the following comparison: Kissingen contains 82 grains to the pint of water; Marienbad, 70; Wiesbaden, 62. On the other hand, Wildbad and Pfeffers scarcely more than two grains; Gastein still less; and Matlock and Malvern less than one grain.

of the kind which an investigation of its chemical composition would lead one to suppose. In a chalybeate spring, for instance, possessing strongly marked tonic properties, the chemical analysis exhibits in most instances not more than half or three-quarters of a grain of this metal to the pint of water. Dr. Gairdner says, on this part of the subject, "In judging of the effects of a mineral water it is important to discriminate what portion of them are to be ascribed to the water itself, what to its elevated temperature in the case of thermal waters, and what to its foreign ingredients. The simple circumstance of dilution will certainly facilitate the operation of matters which might otherwise pass little changed through the alimentary canal; and from the extremely minute state of division in which the active parts are presented to the sentient mouths of the capillary absorbents, it is more than probable that they are directly absorbed into the circulating mass; indeed, in no other way can we account for the powerful effects which result from the use of many chalybeate springs. The strongest does not contain more than five grains of iron to the gallon of water; the real quantity of this tonic received at a single dose into the stomach, or contained in a pint of water, must therefore be exceedingly small, and nevertheless it will exert a more salutary effect upon the system than twenty times the dose of the artificial carbonate in our ordinary prescriptions."

Another writer whom I have already quoted likewise observes, "It is evident to us that the medicinal action of natural mineral waters is not always in relation with what we know of their constituent principles; it is not a few grains more or less of mineralising salts which determine the salutary effect of mineral waters; chemistry teaches us to characterise, to class the waters, shows us the analogies which exist between them, enables us to anticipate some of their properties, by showing us the predominating mineral ingredients, but it belongs to clinical observation, to

the authority of multiplied facts, to determine their therapeutical action." \* Nevertheless, the general actions of the springs containing much mineralising substance may usually be anticipated from the inspection of their tables of analysis. Dr. Vetter says, "It is requisite that the composition should be accurately ascertained in order that the effects may be anticipated. Many persons consider a knowledge of the composition unnecessary, trusting entirely to experience to judge of the effects which they ascribe to the virtue of individual springs; and thus it is that although one may say that Ems, Vichy, Selters, Marienbad, Eger, &c., cure chronic affections of the kidneys or of the bladder, remove tubercular deposits, relieve gout, chronic bronchitis, &c., and that all these complaints are likewise healed by the wonderful powers of Kissingen, Wiesbaden, Salzbrunn, &c., yet one must not say in general terms that all waters which contain a considerable quantity of bicarbonate or muriate of soda are specially applicable and possess curative powers in all those disorders of the assimilation which depend upon altered functions of the secretory organs with tendency to the formation of free acid and to a greater coagulability of the albumen." †

Some springs rich in carbonic acid contain but few fixed constituent principles, and when the gas is but loosely combined with the water they are of little use in a remedial point of view, unless drank at the source. Of this kind is the Bruckenau water, which is perhaps among the richest in carbonic acid, but contains little else except a small proportion of iron, which is precipitated when the water is removed from the spring, and this to a certain extent is the case with all the more purely chalybeate waters; while, on the other hand, those containing salts in large quantity as well as iron, and where the gas is in a state of

\* Patissier, op. cit.

† Heilquellenlehre.

more intimate admixture, are largely exported and retain in great measure their remedial efficacy, of which Kissingen, Marienbad, Fachingen, and Eger, may be cited as instances.

Experience in the ordinary practice of medicine shows that the properties of remedial agents are enhanced by pharmaceutical combination, and the difficulty of mixing these substances as closely as they are to be found in a state of nature is one reason of the superiority of mineral waters over these combinations, and their efficacy depends upon the intimate admixture of the saline, metallic, and gaseous substances with the water to which the heat in thermal springs essentially conduces; so that with respect to this class exportation is seldom attempted. The reason why some strongly impregnated waters (Carlsbad) which act upon the alimentary canal are so well borne, even when taken in large quantities, depends upon the more close amalgamation of the separate constituents into one whole by the action of the caloric.

It will be seen, that although I have often mentioned the same diseases as likely to be benefited by different springs of the same class, and even by springs belonging to different classes, yet that some springs are more adapted to particular cases than others, even though they may appear to be very analogous. It is likewise true, that it may be said of several mineral waters, differing in their nature, as of other therapeutic agents,) that they may be advantageously employed in similar diseases, abstractedly considered; and thus a sulphurous, a saline, or a chalybeate spring may be said, with truth, to be efficacious in scrofulous, bronchial, or rheumatic disease; but each of these and other classes of diseases varies so much in its nature in different individuals and under different circumstances, that it is only by studying the peculiarities in individual cases that the practitioner can best determine from

which kind of spring most benefit is likely to be derived in any given case. Several mineral springs have for a long period enjoyed a special reputation, founded upon experience of their greater efficacy in certain classes of diseases. Thus, Ems and Caûterets have acquired a name for their powers in pulmonary affections; Carlsbad, Vichy, &c., for abdominal and liver derangement; Wiesbaden and Bourbonne les Bains, in rheumatic and paralytic complaints, and so forth; but it must not be inferred from this, that all pulmonary affections to which mineral waters are applicable, are necessarily to be sent to a spring resembling either Ems or Caûterets, nor that Wiesbaden, Bourbonne, and similar waters, are to be preferred in all cases of rheumatism or paralysis; as experience demonstrates that in some affections of the lungs and air-passages, the above-mentioned waters would be prejudicial, and in which a water of a very different kind would be likely to be extremely beneficial; and also, that many cases of rheumatism and paralysis would be much more benefited by other waters, differing very greatly in their composition from those of Bourbonne or Wiesbaden. In this manner, (viz. the stating that such or such a spring is good for any particular disease, without special inquiry into the pathological and constitutional peculiarities,) much harm has been done, and many invalids have consequently returned home disappointed, or worse than they came; but even when a spring appears to the practitioner to be more particularly indicated, it would be unreasonable to expect that its administration is always to be attended with benefit, as various circumstances, such as the idiosyncrasy of the patient, the state of the disease, error on the part of the practitioner in the recommendation and management of the course, or on the part of the patient as regards mode of living, &c., may occur to prevent a beneficial action. Of two persons similarly affected, to whom a course of sulphurous waters, for instance, is

prescribed, one may find his sufferings speedily alleviated, whereas the other may obtain no advantage, or may even be worse; but may subsequently derive advantage by using a spring of a different class. This is often difficult to be accounted for, and in many instances can only be ascertained after the trial has been made. These, however, are exceptions; and any one who has paid due attention to the subject, will be able to determine with tolerable accuracy upon the kind of spring best adapted to individual cases. It is not to be expected, however, that any work which attempts to specify certain springs as best calculated to relieve certain states of disease, can do more than lay down general indications, liable to many exceptions, from idiosyncrasy of patients and other particular circumstances to which I have alluded; hence, also, the relation of cases (as usually reported in books on baths) in proof of the efficacy of particular mineral springs, is almost useless as a test of their powers, as the cases where persons have become better while using the waters are usually selected, while nothing is said of those who leave the place unrelieved, or in a worse state than before,—which circumstance is more frequently the case than is supposed, and very often depends upon a suitable mineral spring not having been recommended at the commencement, or from the adoption of the partial advice of persons, whose ideas of the efficacy of mineral waters are almost exclusively restricted to those of their own locality, or who are actuated by unworthy motives. Alluding to the works with which the press teems, which are written solely to serve individual or local interests, a modern author remarks: “With respect to the mass of publications, treating of mineral waters, which appear in every direction, the vile productions of an egotistical age, the practitioner will not be able to derive the least instruction from them; but they answer so much the better their purpose, which is to attract the ignorant portion of the com-

munity, in which, however, they only succeed for a short time." \*

Mineral waters must be considered in general as alterative remedies, and though their primary operation is mostly evidenced by increased activity of secretory function, yet in many instances no immediate effects are perceptible by the patients, and more benefit frequently results in these cases than in the others, where their operation is more sensibly felt at the time. "The treatment of chronic diseases," says M. Patissier, "succeeds so much the better in proportion as the medication employed is more mild and gradual, and mineral waters are of all the resources of medicine unquestionably the best means of effecting this medication. They act sometimes by modifying the humours, as the Vichy water, sometimes by inducing a slightly acute state which rouses the torpid organs, increases the secretions, and favours salutary crises. When this excitation is slow and moderate, it relieves and removes obstinate diseases, but when too strong it exasperates them, brings into activity latent inflammations, and hastens the progress of organic disorganization. The skill of the physician is, therefore, requisite to restrain this excitation within proper limits, and, so to speak, to regulate it according to the nature and the degree of the disease, and the constitution of the patient."

In some instances, an increase of former pains, eruptions, and feverish symptoms, are induced, though these are exceptional cases as regards the majority of the waters, and sometimes depends upon their improper use. As regards the bath-fever, Dr. Kreysig says, more especially with reference to the Carlsbad

\* Hertz, Die Kunstliche Mineralwasser in ihren Verhaltnisse zu den Naturlichen.

"Most works on mineral waters are but exaggerated lists of diseases: they afford no useful practical information, and they are generally written more for patients than for practitioners."—Chenu *Essai pratique sur l'action des Eaux Minerales*. Paris, 1841.

water, that the cure is often preceded by a state of indisposition with retarded excretions, which is a sign by which the saturation of the humours by the mineral water may be recognized; and when the mass of humours has become charged with the principles of the water, a tendency to critical evacuations is produced. "The blood presents the most manifest signs of vital expansion and increased vital tension, the face becomes red and swollen, the pulse strong, the sleep agitated and interrupted; there is frequently a sense of weight in the limbs, with disinclination to muscular exertion; the belly is swelled if there be constipation, there is slight oppression of the chest, with sense of weight in the head, and headache; the alvine evacuations are frequently suppressed, even in persons with diseases of the digestive organs, without disposition to constipation. After a fortnight or three weeks, sometimes later, a crisis suddenly takes place by evacuations from the bowels, and is followed by prompt and general relief; from this time the water continues to cause moderate evacuations, and to exert a moderate influence both on the local disease and on the patient's general condition."

"Others do not attain this point during the treatment, but, on the contrary, find themselves worse; and a fortnight or three weeks afterwards a change occurs, followed by abundant alvine evacuations, and the consequent cure or great relief of the patient." With respect to the subsequent operation of mineral waters, the same distinguished physician says, "Again, other patients experience no alteration in their symptoms, neither during nor immediately after the treatment. The waters appear to have been without any action on them. Such persons should be subjected, during the winter, to a treatment by medicines which have an analogous operation to the waters. The cure is frequently obtained in this manner, or, at least, it is prepared for the next season; when, on resuming the use of the same waters, they are observed to pro-

duce a speedy effect, and cure as if by enchantment.” “Mineral waters,” says Dr. Von Ammon, “can only produce their beneficial effects in a slow and gradual manner: a hurried perturbatory employment of them not only prevents the cure, but almost always causes an aggravation of the disease; they are drank in order to become mixed with the blood, by means of the digestive powers, and in this manner the curative changes in the body are effected.

“Cold waters are digested slower, and their operation on the vascular system is less penetrating than warm ones. Hence critical signs are much more frequently induced by the use of the latter than the former.

“The beneficial effects of a course of mineral waters is not always evident at the time. But the after-operation (*Nachwirkung*) of mineral waters is not a fallacy, but a truth proved by repeated experience. Many diseases are too ancient and deeply-rooted for a cure to be effected by a month or six weeks’ course; and though an aggravation rather than an amelioration of the complaint, is occasionally experienced at the time, yet the patient frequently feels himself benefited by the after-operation.” \*

“The digestibility of a mineral water,” says Dr. Vetter, “depends chiefly upon the relative proportion of the fixed parts to each other and to the gaseous parts. Waters of a very simple composition are not so easily digested as those which contain more constituent parts. Purely earthy waters are in general very badly borne; whereas water containing the same quantity of salts, with an alkaline basis, is extremely well digested; and wherever an alkaline carbonate predominates, the other component parts of the water are so much the more readily assimilated. There is a considerable number of mineral waters in which the constituent parts maintain each other in equilibrium,

\* Brunnen Diatetik. 4th edition.

so that no one appears to predominate over the others, and the action of the water cannot be ascribed to any ingredient in particular. These waters possess great power, and are among the most efficient. They act upon the diseased organism in very different ways, inasmuch as sometimes one mode of operation, sometimes another, is more evident, according to the nature of the disease against which they are employed. Hence, in the use of these waters, crises frequently occur, producing marked excitation in some organs, and an opposite effect in others."

The richness of some mineral springs in carbonic acid has been made available to the establishment of gas-baths and douches, which are advantageously used in some cases of obstinate disease. When a part of the body is placed in contact with pure carbonic acid gas for a few minutes, a feeling of warmth is first experienced, which is succeeded by a sensation of burning and pricking, which lasts for some time; after which perspiration ensues. If the whole body be immersed, the intensity of the above symptoms is increased, and a decided stimulating effect upon the reproductive organs is produced; the skin becomes turgescient, and breaks out into perspiration. On leaving the baths, persons feel themselves invigorated and in good spirits, the feeling of *bien-être* lasting for some time. When the gas is taken into the mouth it occasions a pricking sensation, which induces contraction of the muscles of the fauces; introduced into the nostrils, it causes sneezing and increased secretion of mucus. Applied to the eyes, the conjunctiva becomes red; the flow of tears is increased, with a feeling of heat and intolerance of light. It need scarcely be added, that as the gas could not be breathed without danger of producing asphyxia, its employment requires cautious superintendence. Mixed with atmospheric air, and inhaled in not too large a quantity, it produces a mildly exciting effect on the mucous membrane of the throat and air-passages.

The application of gas and gas douches is principally made in neuralgic, rheumatic, and paralytic affections, especially of the head and face, some cases of deafness, and amaurosis, chronic discharges from the nostrils or eyes, scrofulous ulcers of an atonic character, torpidity of the reproductive organs, and sterility, amenorrhœa and dysmenorrhœa; in which latter this remedy is particularly recommended by Dr. Mojon, who says, "There are some women who, without suffering from complete amenorrhœa, yet for some days, and even some hours before the appearance of this secretion, are affected with violent darting pains in the uterine region and in the loins. This is especially the case in large cities, in females of an irritable temperament. The same occurs in females of an athletic and sanguineous formation." In these cases the carbonic acid gas has been employed with the best advantage. "It is a powerful contra-stimulant, and antiphlogistic means, which is capable of depressing the economy into a state of torpor and prostration, and relieves the state of congestion."\* It is likewise recommended in the nervous form of gout with painful symptoms, or when combined with paralysis; as also in impetiginous and some other cutaneous affections, morbid perspiration in some parts, as the feet, perineum, &c.

Mud-baths have been used from a very early period. We have the scriptural account of the pool of Bethesda, which was considered to owe its efficacy to the mud when the water was agitated. Galen recommended mud as a cataplasm, in chronic inflammation and edematous tumours. He also mentions having seen dropsical patients at Alexandria who were cured by the mud of the Nile. In Calabria the common people apply mud cataplasms as a remedy against the stings of insects and the bites of animals.

Mineral mud-baths have been extensively used in some localities, especially in Germany, of late years.

\* Schwartze, op. cit.

The mud, strongly impregnated with saline, metallic, and gaseous substance, and decomposed vegetable matter, is found in the neighbourhood of some springs, and is mixed with mineral water to a proper consistency for a bath, which, from its buoyancy, scarcely allows the body to sink to the bottom. Mineralized mud is, however, but of recent introduction as a therapeutic agent, and is highly efficacious in many cases of paralysis, stiffness and contraction of joints, obstinate diseases of the skin and cellular texture. It exerts a powerful action upon the skin and lymphatic glands, resolving obstructions and indurations, and determining a more active circulation of the blood upon the surface than water-baths, both on account of the increased pressure, and from the mineralizing substance being in a more concentrated form. These baths have not, however, a generally exciting action upon the system at the time: persons for the most part feel tranquil, and the pulse is reduced several beats while in the bath. Dr. Vetter says, respecting them, "Of all the means of this class, mud baths have the most energetic action on the circulation of the skin and cellular texture; and there is no mineral water so likely to remove the consequences of local violence in the skin, muscles, and motor nerves; the state of tension, and the morbid sensibility of cicatrices; swellings in the cellular texture, and impaired muscular motion from wounds, contractions, and the kind of paralysis which may be benefited by an excitation on the surface. They have also a powerful effect in herpetic affections."

The effects of these baths are, a general excitation of the surface of the body, redness of the skin, prominence of the superficial veins. The activity of the vital functions is increased, the pulse is fuller, and the persons feel themselves more animated. In some cases, headache, palpitation, and other unpleasant symptoms are induced, which, however, soon

pass off as perspiration supervenes, after which much relief is experienced.

The action of mud-baths is somewhat different, according to the nature of the substance which the mud principally contains. Some contain a large proportion of sulphur, and its operation on the body is analogous to that of its substance, exciting, solvent, and increasing the cutaneous secretions; though, as the sulphur does not exist in the form of sulphuretted hydrogen gas, it does not prove so stimulating to the vascular system as sulphurous waters. These baths are mostly used in inveterate cutaneous and other diseases, where a powerful excitation of the surface is required. The most celebrated are at Abano near Padua, Aqui, St. Amand, Meinberg.

The chalybeate mud-baths contain the sulphate and oxide of iron, silex, carbonic and sulphuretted hydrogen gas: they are powerfully astringent, improving the tone of the skin and cellular texture, increasing the crisis of the blood, and allaying muscular cramps. A sensation of pricking and eruptions on the skin are frequently occasioned by their use. They are chiefly employed in torpidity of the skin and muscular fibre; debility, attended with trembling of the limbs, paralysis, chlorosis; scrofulous and atonic ulcers; some rheumatic, gouty, and neuralgic affections, and contraction of joints. The saline and carbonic mud-baths are rich in salts and carbonic acid gas, and likewise contain sulphur and iron in large quantities. Their action is more penetrating and solvent than that of water-baths, inasmuch as the mineralising substance is in a highly concentrated form. They are employed in the same class of cases which have been enumerated, and to which I have referred when treating of the individual baths in my other work. Franzensbad and Marienbad are the most extensively employed.

The deposit or sediment from various mineral springs likewise forms a mud which is occasionally

used as a local application to stiff or contracted joints, chronic swellings, &c. These baths are contra-indicated in states of increased plasticity of the blood, super-excitation of the vascular and nervous systems, feverishness and organic visceral disease. Mud-baths may be taken at a higher temperature than water-baths, the heat being less apparent.

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## CHAPTER V.

### ADAPTATION OF MINERAL WATERS TO STATES OF DISEASE.

SOME estimate of the applicability of different classes of waters to deranged states of the system will have been obtained from the preceding chapters.

Other more special indications which would lead to the recommendation of particular mineral waters in individual instances, are for the most part to be determined only from an investigation into the general condition of the patient, and the particulars of each case; and even after such investigation it is not always that the practitioner is enabled to decide with certainty upon the best adapted to the circumstances, so much depending in the action of mineral waters, as of other remedial agents, upon idiosyncrasy of constitution, and other causes which may occasion the failure of the means which appear to be most strongly indicated; added to which, errors on the part of the patient, as regards the mode of employing the waters, or as respects diet, &c. not unfrequently, as has been already observed, render nugatory the

beneficial action which might otherwise be derived ; so that the effects of a mineral water should be judged of not from this or that isolated case, but from the aggregate number; and certain principles may be laid down from which may be deduced, with tolerable accuracy, the adaptation of the various classes of mineral waters, or of particular springs, to different morbid states of the system; and I shall endeavour to point out some of the conditions which would lead the practitioner to prefer one kind of mineral water to another, in the diseases to which this class of remedial agents is most applicable.

*Disorders of the Digestive Apparatus.*—The various and complicated derangements to which the function of digestion is subject, either from the organs being primarily affected, or consecutively to functional or structural disturbance of other parts, would require a large volume for their consideration, and they have been frequently treated of by writers of high reputation, although few in this country have sufficiently directed attention to the great advantages obtainable from the employment of mineral waters in the more chronic forms where the efforts of medicine so frequently fail to remove or to procure more than a temporary palliation of the symptoms. The intractableness of these affections is in fact not to be wondered at, considering that in the majority of instances the productive causes continue to operate, and are not reached by the treatment most frequently adopted, viz. the trusting almost entirely to medicines, which are generally such as stimulate more or less particular organs to increased secretion, which organs necessarily become so much the more inactive and disposed to congestion when the stimulus is removed. With reference to the abuse of purgatives, in cases where constipation exists, Dr. Kreysig observes, “ Many faults are committed when the physician attempts to cure patients solely by purgatives, or when he makes these his chief means. Constipation is but a symptom

of itself, it cannot constitute a disease, and it is only to be cured by removing or altering the conditions which cause it to exist. These conditions may be affections of a very different nature, having their seat in different organs of the abdomen, or even in more distant parts, as the brain." In some cases, however, where there has been an accumulation of effete matters producing loss of tone in the coats of the bowels, and various symptoms of an anomalous character, active purgation is requisite, and without it the other means employed would be but of little avail. It is also not unfrequently advisable, before commencing a course of mineral waters, to recommend purgative remedies, but much discrimination is required on the part of the practitioner as regards their prolonged continuance; the faults most frequently committed in this respect, in England, being less of omission than of commission.

It is not my intention to describe the various forms and complications of disorders of the digestive organs, several of which especially where not of long standing, or when connected with inflammatory action or irritation, as indicated by pain on pressure, and other peculiar symptoms, would be better treated by a due attention to the diet and mode of life, and pharmaceutical or other remedies, than by a course of mineral waters, which are more especially adapted to those chronic states which have been produced by the gradual and long continued action of causes which generally escape attention, from their not occasioning any immediate inconvenience, but which after a time induce irregularities in the balance of the abdominal and general circulation, and consequently in the secretions of organs, which have not been sufficiently considered in this country, where the more prominent symptoms so frequently fix in too exclusive a manner the attention of the practitioner. "Let us take a case," says Dr. Vetter, "in which irritation of the stomach and bowels has long existed. The ves-

sels of all kinds are over-distended, the mucous membrane has almost ceased to act; there is obstruction and torpor of the bowels. The consequences of this state may be various, regular or irregular hemorrhoidal affections, dyscratic tendencies towards the skin, evincing themselves as herpes, &c., or towards the fibrous textures, as in normal and anormal gout; obstructions in the liver or spleen, with venous congestion in the lungs, brain, &c.

"We find that it is necessary constantly to direct a powerfully resolvent action upon the torpid and over-filled bowels; and as practitioners, we have not so much to consider whether we have to do with gout, herpes, with hepatic obstruction, dyspeptic hypochondriasis, hemorrhoids, or congestions, &c., whether sleeplessness, or too great a tendency to sleep, is to be combated, for all these are but subordinate phenomena. It is essential to restore the venous system to its proper contractility without producing irritation, and to remedy the chronic repletion which necessarily hinders the free circulation of the blood. What is termed chronic abdominal affection is not always to be looked for solely in the abdomen. As regards the remedy to be chosen, we desire those of energetic, resolvent, but not debilitating properties, as alkalies; due attention being paid to the predominating irritation. We do not wish merely to evacuate, as by this means we should weaken without deriving advantage, and only relieve the surface."

Of the waters best suited for remedying the above condition, Dr. Vetter mentions those of Carlsbad, as the Mühlbrunnen or the Sprudel; or if these be too exciting, the Kreutzbrunnen of Marienbad, and further observes, "In this way we may pass from one spring to another; and if we have to do with much weakness and irritability an alkaline spring would be preferable."

"The general remedial power of mineral waters predominates so greatly over the special relations of

their medicinal constituent parts, that in their employment we must always refer to general indications; and the special indication falls more or less into the back-ground."

The states of repletion of the abdominal venous system, (*unterleibsvollblutigkeit*,) with the consequent obstructions in the circulation of parts, has always been regarded by the German pathologists as the chief cause of many of the chronic diseases for which mineral waters are the most efficient remedies. This condition occurs for the most part in persons about the middle period of life, in those who have been addicted to the pleasures of the table, and is attended with more or less protuberance of the abdomen, with diminished muscular and nervous energy, impaired digestion, deficient or vitiated biliary secretion, piles, &c., as its more constant effects. The imperceptible manner in which the blood becomes altered was ably shown long ago by Dr. Becker, in his work on the Carlsbad waters. "When a man follows an indolent mode of living, and enjoys himself a good deal in eating and drinking, the food which, in proper quantity and quality, would produce a nutritive juice of a mild and homogeneous nature, which, carried into the blood, would restore the strength, is transformed into a slimy, tenacious, and acrid fluid, which does not form an homogeneous mixture with healthy blood. It is not immediately, nor even in the first years, that the depraved state of the juices causes any particular inconvenience to the individual which might warn him of the approaching evil. He still feels himself tolerably well, though the blood becomes from time to time more vitiated, till at length the corruption of the juices arrives imperceptibly at such a degree that it induces morbid conditions in the solid parts, and now the individual will not fail to experience the effects, as the acridity stimulates the sensible and already weakened vessels to increased activity, and the tenacious blood is no longer able to penetrate the finer

kind of vessels; whence arise obstructions, which take place chiefly in the abdominal viscera, and from neglect often rapidly increase. The juices which stagnate in the obstructed vessels fall at last into corruption. They become decomposed, corrode the solid parts, and occasion irremediable changes in the organs. The glands become hardened, almost without hope of their being again restored. The obstructed bile hardens in the gall-bladder into gall-stone. The urine which remains a long time in the excretory vessels lays the foundation for stone in the kidneys," &c.

To remedy this state various mineral springs may be had recourse to, according to particular circumstances, and among them those of Carlsbad hold the first rank, especially where a penetrating and aperitive action is required; though, as has been before observed, the benefit obtained from these waters does not necessarily depend upon the bowels being acted upon at the time; for in many instances this effect does not take place until the system has become in great measure saturated with the water, when critical evacuations frequently supervene; and it is therefore prejudicial, in most instances, to drink too freely of the waters, so as to induce continued purgation; nor even if a degree of constipation be present, would it be always advisable to have recourse to active means to remove it, provided no unpleasant symptoms were experienced, as in most instances this condition would cease in a day or two without interference. The Kreutzbrunnen of Marienbad is also well adapted to this form of disorder, especially when the Carlsbad waters excite too much, or where a tonic as well as a solvent action is required. The same may be said of Kissingen, which is even preferable in some cases, and in the two last places baths may often be combined with the internal use of the water, which is rarely advisable at Carlsbad. "The nature of the

Carlsbad waters," says Kreysig, "tends to increase the expansion of the blood, and to occasion internal changes in it; and from the application of the waters to the two most extensive surfaces of the body, the labour of nature is necessarily double, and the patients are very frequently excessively affected by it, so that the simultaneous employment of baths, and of the water internally, may very easily produce too strong a reaction." When confinement of the bowels is an urgent symptom, a short course of Pullna or Saidschutzhut may be advisable, preparatory to the employment of the Homburg, Kissingen, or Carlsbad water. When this is not the case, and especially when an opposite state obtains, much benefit will frequently be derived from Wiesbaden baths and douches, the water being drank at the same time, or the Soden water being substituted for it. These baths, by determining powerfully to the surface, and by exciting the activity of the nervous and vascular systems, tend materially to equalize the circulation, and to remove internal congestion, while by the internal use of the water the mesenteric glands and absorbent vessels are stimulated to increased activity, and the secretions are improved.

The dyspepsia occurring in persons of a spare habit, olive or sallow complexion, (bilious temperament,) and accompanied with irregular or confined bowels, torpor of the liver, a yellowish furred tongue, bitter taste in the mouth, and acid eructations or heartburn, is also most likely to be relieved by a course of one or other of the Carlsbad, Marienbad, or Kissingen springs; and the same may be said of those who have long resided in tropical climates, or in the vitiated air of large cities, and who suffer from analogous symptoms. Where a more tonic effect is required, and constipation does not exist, the Franzquelle of Franzensbad (Eger water) will answer the purpose. The above-mentioned cold waters are also extremely well adapted

to rectify the form of indigestion, where the stomach is solely or chiefly affected and its secretion disordered; though in some cases the thermal springs of Wiesbaden and Ems agree better, especially when an aperient action is not required.

In general, the Carlsbad springs would be less suited to remove the dyspeptic symptoms of persons of a full plethoric habit and active circulation than one of the cold saline aperient springs. Women, also, who lead an inactive life, are inclined to *embonpoint*, subject to irregular determination of blood to particular organs, marked by flushings, headaches, and coldness of the extremities; who complain of nervousness, and are liable to become flurried on slight occasions, (which symptoms are often very improperly treated by stimulants and tonics,) and in whom disorder of the digestive apparatus exists as a concomitant affection of the impaired balance between the arterial and venous systems in the abdomen, would not be so likely to have their complaints removed by Carlsbad, as by a course of bathing in an alkaline or saline spring, with the occasional use of the douche, and the internal exhibition of a water like Marienbad, Rippoldsau, or one of those above named. The languor and weakness complained of by these patients depends upon the oppression of the vital powers from the torpid circulation, and must be carefully distinguished from true debility, as the remedies calculated to be of service in the latter state would be extremely prejudicial in the former. This distinction has been well insisted on by Dr. Heidler, in his work on the Marienbad waters, which I have not at hand, but will avail myself of the translation of the passage from a Medical Review:—“The feeling of lassitude and exhaustion, a small pulse, cold extremities, and cramps, are usually only symptoms of sluggish circulation, plethora of the portal veins, and morbid irritation of the nervous

\* British and Foreign, October, 1842.

system of the abdomen. The effect of remedies in these cases, as well as the history of the disease, prove this. The symptoms occur in those who eat succulent meats, drink beer and wine, sleep much, are idle bodily and mentally. Those who gain hunger, thirst, and sleep by the sweat of their brow, and live on bread, water, and a little soup, together with the meat from which it is made, are not so affected. False or apparent weakness is common to many patients suffering from disorder of the abdominal circulation; their contracted pulse seems feeble, but it is not conjoined with the other symptoms which characterise either excess or want of vital power. Such patients have these symptoms: sensation of lassitude, palpitations, and spasms, produced by the slightest exercise and emotion, sometimes even by remaining a short time in a hot room, by a cup of coffee, a glass of wine, or hot soup; they have constantly cold extremities, shivering, difficult and slow digestion, and complexion earthy, pale or bilious; sometimes, however, good, and indeed too red. Such persons are particularly women suffering from piles, congestions, or a high degree of abdominal plethora; they are believed often to be without strength and feeble, and are treated most injudiciously with tonics and stimulants."

In the form of indigestion in which the chief symptoms arise from a morbid susceptibility of the nerves of the stomach and bowels, the bathing in and drinking a slightly mineralised thermal water, as Baden, Bath, Wildbad, Schlangenbad, St. Sauveur, is very frequently productive of much advantage. Ems is also advantageous in cases of this nature; sometimes, however, a cold alkaline water, as Selters, has a better effect, and may even be combined with a course of bathing in a water similar to those above-named. In those cases where the chief defect is a want of tone of the muscular system in general, or of the digestive organs in particular, as frequently occurs

in elderly people, but also not unfrequently in younger ones, the waters of Wiesbaden, the Railliere spring at Caûterets, or the acidulous and tonic ones of Kissingen, Fachingen, Bruckenau, or, where a more direct tonic is required, Schwalbach or Spa, which by imparting tone to the muscular coat of the bowels frequently removes the cause of constipation, and thus these, though under ordinary circumstances astringent waters, become the most effectual aperients.

In most of the disorders of the digestive organs, when of long duration, the effects of climate are strikingly manifest, and the moral influence of travelling through interesting countries, the mind being exempted from anxiety and the cares of avocation, (which perhaps were mainly instrumental in producing the complaint,) together with a residence during the winter in one of the towns in the south of Europe, as Pau, Rome, Florence, Naples, &c., according to circumstances, will greatly conduce to render more permanent the benefit which may have been previously derived from a course of mineral waters.

Old East or West Indians, or others whose health has been deteriorated by a residence in unhealthy climates, with more or less derangement of the digestion, even though they may not be labouring under actual disease of any particular organs, will generally derive great advantage from adopting the plan here specified, viz. a course of mineral waters in the summer months, and wintering in the south of France or Italy before residing in England. I have known several returned from India, whose health has become seriously impaired, which I consider to be in great measure owing to the sudden change from the climate and mode of living in India to those of England; which change persons in advanced life, or in an impaired state of health, are ill calculated to bear. Such persons will frequently find the advantage of becoming acclimated to Europe by passing the

first winter or two in the south. When disease of the liver exists, with acidity and other symptoms of disordered digestion, Vichy will often be eminently serviceable, especially if an aperient action be not required.

Persons who lead a sedentary life, as those engaged in literary occupations or in counting houses, in whom the activity of the brain is not sufficiently alternated with muscular exertion, especially if breathing the vitiated air of confined apartments in a city like London, frequently suffer from deranged conditions of the digestion and a predominance of the abdominal venous circulation, of which some of the most constant symptoms are, depression of spirits, undue anxiety, or irritability of temper, which are often ascribed to extraneous or accidental causes. In fact, in these cases the blood is too highly carbonized, whence the sombre cast of the thoughts; and nothing is so well calculated to remove the symptoms as the change to a watering-place, breathing a purer air, and the employment of such a water as would restore the balance of the circulation, and rectify the disordered digestion. For those who are not able to take a long journey, in this, as also in the conditions of digestive disorder which have been mentioned, artificial waters offer a great resource—or Harrowgate, Cheltenham, or Leamington might be resorted to in the season.

Hypochondriasis is closely allied with derangement of some part of the digestive apparatus, of which it is in many instances a consequence, though not unfrequently a cause of such derangement, and occasionally exists independently of it; in fact, so close is the connexion between the brain and the alimentary canal that whatsoever affects the one soon reacts upon the other. The effects of mental impressions upon the process of digestion, and upon various secretions, producing in some instances an increased flow, in others an arrest of secretions, are too well known to require that I should do more than allude to them;

while, on the other hand, irritation, or disorder of the stomach and bowels, is a very common occasion of hypochondriacal symptoms, though these mostly pass away when the cause is removed, if a predisposition to the disorder does not exist. In these slighter cases much harm is often done in England, and the disorder is aggravated by the too free use of purgatives and mercurials, which from their relieving the symptoms for the time, are usually had recourse to on their recurrence, the viscera being thus kept in a constant state of excitation. Where permanent functional or structural alteration of a part exists, giving rise to the symptoms, the disorder is said to be of the material kind as distinguished from the more purely nervous, which is of a cerebral origin, and which requires a different treatment, though in both mineral waters and climate are most effectual means of relief. In the former kind, medicinal means to remedy existing local disorders require to be adopted. Of the mineral waters best calculated for the purpose I may mention Carlsbad, Marienbad, Wiesbaden, Homburg, Soden, Kissingen, Leamington, Harrowgate, employed as circumstances in individual cases may indicate,—and the medicinal action of the waters is in these instances greatly assisted by the effects upon the mind produced by the change of air and mode of living, the amusements, &c., at watering-places. In the purely nervous kind of hypochondriasis, where the disordered digestion or circulation appears to be a consequence of the morbid susceptibility of the nervous system, the cold waters of Marienbad, Kissingen, in some cases combined with bathing in a slightly mineralised thermal water; in others, Fachingen, Eger, Bruckenau, and other chalybeates, will be the most applicable; and the climates of Nice, Naples, Malta, or Pau, in the winter, will generally be found to be productive of great advantage. Pau, Florence, or Rome, for a short period, will generally be better than Nice or Naples in the first variety of the com-

plaint, especially if there be much excitability of the nervous system.

*Gout and Rheumatism.*—Next to derangement of the digestive organs, gout is the disease in which a degree of permanent advantage is to be expected from mineral waters, the same causes being in many instances productive of both, and in the latter especially, even when not complicated with much disturbance of digestion, the blood having become gradually altered from its healthy condition, either in consequence of hereditary or extraneous influences, or of both combined. In general, in gout occurring in persons of a full habit, with constipation and other symptoms of torpid digestion, the cold aperient waters, or even one or other of the springs of Carlsbad, would be better adapted to the circumstances than a course of baths, though these may be often advantageously combined when the dyspeptic symptoms are in some measure removed. The habitual drinking for some months of an alkaline gaseous water, as Selters and especially Fachingen, will be highly beneficial in this, as indeed in all forms of gout, it being understood that due attention must be paid to the diet and mode of life, without which little else than temporary relief can be expected from any means. In the above complication, the regulated diet and the active exercise enjoined at the cold-water cure establishments tends greatly to the benefit which many of the patients have derived, though the advantage is frequently not of a lasting nature when they return home. The process of copious sweating, on the one hand, and drinking freely of pure water, on the other, which constitutes the essential part of the treatment, gradually renews and purifies the mass of blood. The above-named waters might also be employed in youngish persons who have not as yet suffered much from the disease, combined with bathing in a slightly mineralised water, as Wildbad, Chaudfontaine, Buxton. These and analogous baths, and particularly Teplitz, are best adapted to the nervous

or shifting form of the disease; whereas in those cases of long standing, without much excitability, but in which there is so frequently a deposit of calcareous matter in the smaller joints, occurring for the most part in persons beyond the middle age, I consider Wiesbaden to be the bath from which there is most probability of obtaining a cure, or at all events considerable amelioration, and this must be effected by the alteration of the blood caused by the absorption of the salts of soda with which the water is so strongly impregnated, and of which the absorption is so greatly facilitated by the high temperature. The same may be said of Vichy, which is also one of the most efficacious waters in this form of the disease. I have known many elderly patients who were accustomed to have several attacks in the course of the year, but who, after a course of the Wiesbaden baths—even when the water was not drank—have remained free from gout, notwithstanding little or no change had been made in their usual mode of life; and many also who calculated almost to a certainty of escaping their winter attacks, by a three weeks' or a month's residence at Wiesbaden in the summer. A few patients, however, have not found Wiesbaden so well suited to them as Ems, Bath, or Buxton. To some, again, the warm sulphurous springs would be best suited.

The chronic forms of rheumatism and its consequences are more effectually combated by a course of thermal baths than by any other means, and almost all warm springs would be productive of more or less benefit, which would not be the case with baths of common warm water. It by no means follows, however, from this, that the choice of a spring is a matter of indifference; and, indeed, if there were much co-existent derangement of the digestion, bathing should not be commenced before this be rectified, either by medicines or appropriate mineral waters. In general, however, the same rule may be given for bathing in rheumatic as in gouty cases, viz. in the

more irritable forms a slightly mineralised thermal water in an elevated position,—Wildbad, Gastein, Leuk, Plombières, or even Baden-Baden, which is highly efficient in many cases. The water may be taken inwardly at the same time, or one of a different character, as a cold gaseous or aperient may be substituted according to the existing indications. To the more chronic forms, unattended with excitability of the system, and especially where contractions and other deformities have been induced, the more powerful sulphurous or saline thermal waters are especially adapted. The springs of the Pyrennees, Balarac, Aix-la-Chapelle, Borcette, and especially Wiesbaden, Aix-les-Bains, and the hotter springs of Teplitz, may be more particularly enumerated. In many of the worst cases of this kind the mud-baths of Marienbad or Franzenbad will be very advantageous. These long standing and complicated cases would also very probably be relieved by any of the more slightly mineralised baths which are recommended in cases of rheumatism, as well as of other complaints; but the benefit would not be so likely to be lasting as from the employment of a spring similar to those last-named. In some of the more intractable cases vapour-baths and vapour-douches might be advantageously combined or alternated with water-baths.

Gout and rheumatism are, perhaps, more than any other class of diseases, capable of being relieved by climate subsequent to the proper employment of baths of thermal waters; and many patients who derive great benefit from these latter remedies lose the advantage they had gained by passing the subsequent winter in England, and especially in the more raw and damp atmosphere of Ireland. By a warm winter climate the effect of the baths is, in fact, in great measure kept up till the ensuing summer, or at all events it is not counteracted by the impression of a cold, moist atmosphere upon the lungs and skin, which was perhaps the chief cause of the disease.

Gouty patients of an irritable or inflammatory habit will generally find Pau or Rome agree better with them than either Nice or Naples, which, however, will be best adapted to the more numerous cases where these counter-indicating circumstances do not exist. Rheumatic patients will often be benefited by passing November, December, and January, at either of the last-mentioned towns; they should, however, remove before the spring winds set in. For many of these patients, Pau would not be so eligible, neither would a prolonged sojourn at Rome be advisable.

Closely allied to rheumatism are the forms of tic and neuralgia, these being frequently produced by the same causes, viz. exposure to wet or cold, and suppression of the insensible perspiration, though in many instances these affections are traceable to other causes, especially stomach or liver derangements, malarious influence, &c. Here, also, a course of thermal bathing, by promoting a free action of the skin, and by equalizing the circulation between the surface and internal organs, as also by the therapeutical effects produced by the absorption of the water, is often productive of a cure after the failure of other means. I have had several opportunities of witnessing the effects of the Wiesbaden waters as baths, and taken internally in these cases. Teplitz, Wildbad, Plombières, Carlsbad, Marienbad, and other springs, are likely to be beneficial in many cases; the three first-named more particularly when general excitability is present, the two last when visceral obstruction or functional disorder exists. In these cases, also, climate has great influence, though a prolonged residence at Rome would generally disagree, and will sometimes aggravate the symptoms.

*Paralysis.*—When paralysis is a consequence of apoplectic attacks, it is seldom capable of being removed by mineral waters and climate, any more than by other remedial means, though a degree of amelio-

ration may be frequently obtained, and some of the distressing symptoms may be essentially mitigated by these measures. For the cure and relief of some other kinds of paralysis, however, this class of remedies is peculiarly adapted, and not unfrequently succeeds when all else has failed to render effectual service. When, for instance, paresis, or complete paralysis of a part supervenes upon repeated attacks of gout or rheumatism, from exposure to wet, or from the super-excitation induced by excesses, or from the depressing influence of malaria, &c., there is great probability of recovery from the judicious employment of these means, according to the peculiar circumstances in individual cases. In some instances, where a more powerful action is required to rouse the energy of the system, a thermal sulphurous water, as of the Pyrennees, Aix-la-Chapelle, or Aix-les-Bains, or a strongly impregnated saline one, as Balaruc, Wiesbaden, or Borcette, would be most advisable, combining the use of the douche with the baths, especially when the complaint is of a rheumatic origin, or depending upon the impression of poisonous influences, as malaria, the abuses of mercury, or from the employment of this and some other metals by workmen, &c., or when it appears to be of a purely local nature arising from deficient energy of the nerves of a part, or of the spinal chord consequent upon exposure to cold and other analogous causes. To many cases of this kind, however, and particularly where there exists either much general weakness or excitability, baths of one or other of the more slightly impregnated thermal alkaline or saline springs would be productive of more benefit. Bath, Baden-Baden, Baden in Switzerland, Plombières, Luxeuil, Wildbad, Buxton, Teplitz, Gastein, offer a choice of means to be determined by the indications in particular cases. Much depends, as regards the effects of these baths, upon the locality; hence the pure mountain air of Gastein, combined with the penetrating

powers of its waters, would be eminently calculated to brace a relaxed nervous system, and remove the debility or paralysis of youngish subjects, which has been perhaps induced by over-excitement or excesses; whereas, in the majority of such cases the more relaxing summer climate and such a bath as Wiesbaden or Bath, would most likely prove prejudicial, and the more strongly impregnated water of the former place would very probably add to the excitation. Wiesbaden or Aix-les-Bains would, therefore, be more suited to elderly subjects in whom a degree of torpor exists, and to whom the heat of the localities would rather be advantageous by assisting the action of the waters. Bath might be resorted to for a continuance of the treatment in the autumnal and winter months, or those patients who could remain at Wiesbaden might derive great advantage from continuing the baths at this season with due precautions. Where a more sedative action is required, Wildbad, the cooler springs of Teplitz, Chaudefontaine, Plombières, or Buxton, might be resorted to in the summer with advantage. Patients to whom these springs are adapted would generally find Rome or Pau suit best as a winter residence,—the former city should not, however, be chosen where there is a tendency to determination of blood to the head; those whose cases require a strongly impregnated hot spring would also frequently derive advantage from wintering at either of the above towns or at Pisa. Some patients, however, would find themselves better at Nice, Naples, or Malta.

*Calculous Disorders.*—The calculous being closely connected with the gouty diathesis, the means which are serviceable in removing the latter would also be frequently adapted to the former. In some instances, however, the tendency to form gravel and stone is not connected with gout, but depends upon mode of life or other causes, as is seen in the prevalence of these disorders among children of the poorer classes.

Several diseased states of the urinary organs also conduce to the formation of sediments, which are only to be removed by appropriate medical or surgical treatment, and are not so likely to be benefited by mineral waters. This is especially the case as regards alkaline or phosphatic deposits, which, however, occur much less frequently than the opposite state, viz. where the gravel and calculi are composed of uric acid or urate of ammonia. In an essay by a distinguished Parisian chemist, which I translated and published some years ago in a medical journal,\* there are tables of the calculi which he analysed for several practitioners. Thus, in one table, out of 141 calculi, 121 were composed of uric acid or urate of ammonia, and about the same proportion obtained in other instances; these calculi were found, on experiment, to be most easily acted upon by alkaline solutions and mineral waters, and the results obtained from subjecting patients suffering from gravel or stone to a course of the Vichy waters were, as stated by Dr. Petit, the assistant inspector of the baths, in the highest degree satisfactory. By the use of the Vichy water the urine and secretions become speedily alkaline, and the gravel voided diminishes in quantity. In some instances the urgent symptoms of stone, from which the patient had previously suffered, were relieved, and no stone could be subsequently detected, by carefully sounding the bladder, though its presence had been verified by some of the most eminent practitioners of Paris, before the patients went to Vichy. It would be out of place on the present occasion to enter upon the consideration of the practicability of dissolving calculi when already formed in the bladder, and of the lithontriptic powers of the Vichy or any other alkaline water; but I think that if attention were earlier directed to these complaints, much might be done by similar means towards their entire re-

\* On the dissolution of gravel and stone in the bladder, by A. Chevallier, Member of the Royal Academy of Medicine, &c.

moval before a stone becomes formed, or when formed, towards preventing its increase, and the necessity of an operation would be often superseded. When also it has been deemed advisable to perform the operation of lithotrity, the free use of a water containing carbonate of soda and carbonic acid, as Fachingen, Selters, or Vichy, would materially assist in procuring the removal of the detritus and in preventing a recurrence of the complaint.

*Scrofula.*—The consequences which a scrofulous diathesis entails are only to be prevented or removed by the counteracting influence of proper means employed at an early age. Of these means, the breathing a pure air, attention to the quality of the food, to the clothing, to due muscular exercise, and to keeping in good order the digestive apparatus, are the most essential. A residence near the sea, and cold or tepid sea bathing is advantageous in many cases; and in the great majority mineral waters may be beneficially employed, both as baths and taken internally, though much discrimination is required in the choice of the water which may be best suited to any given case. In the form of the disease marked by general languor and torpor of the system, pallid unhealthy countenance, impaired digestion, swelled glands, or other evidence of local mischief, the employment of a warm saline spring, as Wiesbaden, or if this were not well borne, Baden-Baden would be frequently beneficial, as a preparatory means to the use of one of the springs more strongly impregnated with salt, and which contain iodine and bromine, as Kreutznach, Soden, Ischl, Salzhausen. In some cases of the above kind a cold gaseous tonic and aperient water, as the Ragozzi of Kissingen, with baths of the Pandur or of the salt springs, would be eminently serviceable; in others again the Carlsbad Sprudel, or Muhlbrunnen, would be preferable, especially where torpidity or irregular action of the bowels is a leading symptom. In most instances, however, where this complication does

not exist, recourse might be had at once to one of the above-named salt springs; some of the lees from the evaporation of the water being added to the baths, which, however, being thus rendered exceedingly stimulating, will require to be carefully superintended. These springs would not be so well suited to the more irritable form of the disease where the circulation is more active, the complexion fair, and the countenance more florid. Of Kreutznach, Dr. Vetter observes, "The cases to which Kreutznach is less to be preferred than other springs, are the more erethetic and irritative forms of tubercular and glandular enlargement, with a tendency to the formation of coagulable albuminous products. In such cases occurring in delicate and irritable subjects, though the action of saline springs cannot be denied, yet the alkaline springs internally and externally employed, on account of their mildly solvent and penetrating operation, are much preferable." In such cases Ems would, therefore, be more particularly indicated. Some patients of a relaxed, and not of an irritable habit, would derive most benefit from drinking a gaseous chalybeate, as Bocklet, Bruckenaue, Schwalbach, Spa, baths of the water being used at the same time. Where much excitability exists, baths of Schlangenbad, or Baden-Baden, with the internal use of a cold alkaline, as Selters, or an aperient water, as Rippoldsau, would be most likely to be beneficial.

After a properly directed course of mineral waters, climate is calculated to exert the greatest influence over this disease; and of the climates of the south of Europe, a dry exciting atmosphere, as that of Nice or Naples in the winter, would prove most advantageous in many instances, but in those patients of a more excitable habit, the above-mentioned localities would very likely disagree, and Pau, Rome, or Pisa, according to circumstances, would be preferable.

*Pulmonary Diseases.*—The various indications to be fulfilled in complaints of the lungs and air-passages

require much discrimination as regards the choice of a mineral water suited to particular cases, for in many these agents would be inapplicable, or not likely to produce benefit; but, on the other hand, there is a large proportion of the more chronic cases in which they are calculated to render the most effectual service, both as a curative and preventive means. In the congestive or subinflammatory form of bronchial derangement of long duration, which so frequently depends upon disordered function of other organs, especially the skin, nothing would so greatly contribute towards the restoration of health as a course of thermal baths, which by determining to the surface, would equalize the capillary circulation, and thus relieve the congested organs; and this purpose might be effected by almost any of the thermal waters, though in some cases a sulphurous or strongly impregnated saline spring, as Wiesbaden, would have a better effect than those less strongly mineralised, as Baden, Bath, Bagnères de Bigorre, or Ems, which, however, would be better adapted to other cases where the former might prove too exciting. The water of any of these springs might be drank at the same time as the bathing, or a water of a different kind might be substituted according to existing indications. When derangement of the alimentary canal is present, accompanied by constipation, Carlsbad, Aix-la-Chapelle, Marienbad, Kissingen, Soden, would be beneficial in many instances. In other cases a more purely alterative, or even a chalybeate water, might be employed. In the chronic bronchitis of elderly persons, the bathing in and drinking the Wiesbaden water is usually beneficial, and when the tendency to congestion and increased secretion from the membranes is in some measure removed, a cold gaseous chalybeate may often be advantageously substituted for drinking, by which means the parts would be most likely to regain their tone. In the more erethetic forms of bronchial disease, occurring in younger subjects, and where

there is a threatening of consumption, bathing in one of the above-mentioned slightly mineralised springs, or in the Wildbad, Schlangenbad, St. Sauveur, waters, would often be serviceable. In these cases, however, bathing is frequently counterindicated, and when recommended should always be combined with the internal use of an appropriate water, that of Ems, Caûterets, the Eaux Bonnes, Weilbach, would be most advisable in some cases; in others, Fachingen, Selters, the Maxbrunnens of Kissingen, or others of the acidulous waters should be preferred. Where the pulmonary symptoms depend upon a scrofulous disposition, and there is reason to apprehend the formation of tubercle, Ems would be serviceable in many cases, in others the waters of Kreutznach; in some others, attended with much relaxation and debility of the system, a light gaseous chalybeate, as Fachingen or Schwalbach might be recommended. When, however, the symptoms of confirmed phthisis exist, all bathing is counterindicated, nor is much permanent benefit to be expected from the internal use of any waters; but in the incipient form of the complaint a cold sulphurous water would often be serviceable, and might be used when other springs would be too exciting. The Weilbach water enjoys a high reputation in similar cases, as do the warm waters of the Eaux Bonnes, although the distance would be a great objection to many English patients. Selters is also extremely beneficial in many diseases of the respiratory apparatus, and there is the advantage that as patients do not resort to the place, the water being exported, it may be used at any season. Hufeland speaks very highly of this water in these cases. "But it is in chronic diseases of the lungs, and especially in pulmonary phthisis, that the water is of the greatest efficacy. In this disease where other powerful remedies produce no good effect, Seltzer water is often of extraordinary efficacy. Where there exists relaxation of the mucous membrane, by the exciting property

peculiar to it, the energy of the relaxed vessels and mucous glands becomes established: in the tubercular kind it resolves obstruction without exciting inflammatory irritation, and where inflammatory complication exists, it regulates the anormal secretion and often prevents suppuration. I say all this after great experience, and could quote many cases of success. Seltzer water seems to contain the due admixture of principles required in this disease, viz. a slightly stimulating action, and the faculty of producing an increase in the power of the lungs and glands, without causing determination of blood to them or accelerating the circulation through the body. It produces the best effect in this disease when mixed with a third part of warm milk, especially asses' milk."

As the quality of the air which is inspired into the lungs is a point of as much consequence in chronic pulmonary affections as would be that of the aliment introduced into the stomach when this organ is in a disordered state, the effects of climate in these affections need not be insisted upon: and unless a circumstance of such importance be attended to, the powers of medicine will frequently be of little avail, or will only be capable of relieving urgent symptoms; though this is too frequently not sufficiently considered until the disease has long existed. This remark more especially applies to consumption, which may often be effectually checked in its earliest stage (particularly among those who are able to select or to change their place of residence as circumstances may require) by suitable climate, regimenal and medicinal management." In many cases great advantage, if not a permanent cure, may be obtained by a sea voyage, and by the climate of Madeira, which from the equalness of its temperature and freedom from winds, would be the most advantageous locality abroad for consumptive patients. When there is no existing disease but a general delicacy of the constitution, or a predisposition to consumption from hereditary ten-

dency or a strumous diathesis, Nice, Pisa, Rome, Naples, or Pau would be preferable to Madeira. These remarks also apply to affections of the larynx and bronchia, which are so frequently difficult to distinguish from phthisis, even with the aid of auscultation and percussion.

*Chlorosis.*—The general languor of the functions, pallor of countenance, feeble or irregular action of the heart, and other symptoms indicative of an impoverished state of the blood point out chalybeate springs as the most natural remedy, and, in fact, the marked and rapid improvement which many patients experience while going through a course of these waters sufficiently justifies the expectation, that more benefit is obtainable from chalybeate waters in consequence of the dilution and intimate combination of the iron with the other constituents, than from pharmaceutical preparations of this metal; and it has been already shown that when these preparations are administered, but a very small proportion of the iron is absorbed. It is not always, however, that patients are in a fit condition to enter upon a course of direct chalybeates, and in these cases a thermal, saline, or alkaline spring for bathing, with the exhibition of a cold aperient and tonic water, as Homburg, Marienbad, Kissingen, Rippoldsau, Eger, would be attended with most benefit, and might after a time be replaced by a more direct chalybeate. The more exciting climates of Nice or Naples would be better suited to the majority of chlorotic patients than Rome or Pau.

*Nervous Disorders.*—Different pathological conditions are comprised under this term; and these require to be minutely inquired into, before determining upon the remedies to be recommended, much harm being frequently done by prescribing for the mere consequences or symptoms. Some states of nervous disorder have been already referred to when speaking of derangement of the digestive organs; those of a more strictly nervous character, arising from various

causes of a moral or physical nature, admit of being cured or greatly alleviated by the proper employment of mineral waters, and of these the slightly mineralized baths, Baden, Wildbad, Buxton, Chaudefontaine, and especially Schlangenbad, where excitability is the predominating symptom, will be attended with great benefit, combined with drinking an acidulous chalybeate, when not counterindicated. This increased excitability to external impressions is generally a consequence of debility of the nervous system, and occurs for the most part in women of the upper and middle classes who lead sedentary lives, in studious men, artists, and others, whose muscular powers are not sufficiently called into activity, as compared with that of their mental faculties or of their imagination. It very often supervenes likewise in those who have too rapidly exhausted the sources of pleasurable excitement. Here, a change in the mode of life, muscular exertion, sea bathing and swimming, the cold-water cure, or chalybeate baths and waters, would be the most efficient means of restoring the strength. When direct chalybeates are not well borne, the Rippoldsau, Eger, or Fachingen water will be found extremely beneficial, as combining the alterative and tonic properties. Hufeland speaks highly of Schlangenbad as a bath for the relief of nervous affections of a spasmodic nature, and I have had several opportunities of testing the accuracy of his statements. "Its operation is softening and sedative, allaying irritability. I know no bath so proper for all kinds of nervous affections, especially in females unable to bear medicines or mineral waters in general; and where the chief indication is to diminish morbid irritability and convulsion. In such cases Schlangenbad is a true and often the only means of strengthening the nerves, while Pyrmont or Driburg would fail." In some instances which have fallen under my observation, even the baths of Schlangenbad have proved too exciting, and have increased the nervous irrita-

bility ; and in such cases tonics would only aggravate the symptoms, the cause of which will generally be found to depend upon disorder of some of the abdominal or pelvic viscera.

The debility of the nervous and muscular systems, arising from diminution of the mass of the circulating blood, either in consequence of a long illness, hemorrhages or exhausting discharges, insufficient food, or deficiency of the digestive power, will be best removed by those chalybeate waters which contain a due proportion of carbonic acid. Fachingen, and more particularly the Weinbrunnen of Schwalbach, would be well suited to these cases, bathing in the water being enjoined as well as drinking.

This and similar waters, as the Pouhon of Spa, the Ludwigsquelle at Bocklet, the Carolinenbrunnen at Marienbad, would be best adapted to remove the debility of the stomach and bowels with consequent scanty or impaired secretions, by exciting the activity of their glands, and at the same time imparting tone to the muscular coat of the bowels, would tend to remove either a too relaxed or torpid state much better than cathartics or astringents, the action of which is purely local. A constipated state of the bowels not unfrequently arises in weak persons from a deficiency of their vitality and muscular energy, and would be best removed by remedies which impart increased vigour to the system. On the other hand, a degree of relaxation may arise from the same cause. Hence these opposite states may originate from the same source, viz. debility, and may often be rectified by the same remedy. The quantity of iron absorbed into the system by daily bathing in and drinking a chalybeate water for three weeks or a month, by increasing the fibrin of the blood, most effectually conduces to the improved tone of the muscular and nervous systems, which is so generally apparent in patients to whom this class of remedies is adapted.

In the debility which so frequently occurs in con-

sequence of excesses and over stimulation, baths of a slightly mineralized water in a mountainous locality would often prove the most effectual means of cure ; and of these Gastein, where it could be resorted to, would deserve the preference. Kreuth, in Bavaria, is also well adapted to removing this state. Of the first named bath a resident practitioner (Dr. Eble) says, " The more purely nervous the debility is, and the less it depends upon material or organic affections, so much the more certain, effectual, and wonderful is the power of these baths." In the debility of the generative organs from the above-mentioned causes, the Gastein baths may also frequently be employed with great benefit.

The advantage of climate and occasional change of locality in nervous disorders will scarcely be questioned by those who have had much opportunity of seeing how frequently they resist the efforts of medicine, and the great influence exerted over them by different states of the atmosphere. In some of these disorders, where combined with a state of generally deranged health, there exists habitual depression of spirits, the brilliant skies, fine scenery, and animation of Naples, would greatly conduce to their removal. Nice would likewise be an advantageous locality for two or three months, or even Florence, which offers more resources for amusement, would not be objectionable. Pisa would not, in general, be recommendable in these cases, on account of its dullness, but would be better suited where there existed a morbid excitability of the system, and where quiet is required ; in which case also Pau would be a good locality. In most nervous complaints Rome would be objectionable for a long sojourn, though there are exceptions, and a visit of a few weeks will generally be productive of advantage to those who have never been there, and who would be likely to feel an interest in its ruins or works of art, by which the mind may be beneficially diverted. In some cases of nervousness,

which a prolonged residence in Italy would tend to increase, the passing a winter at Munich will be beneficial, especially to those with whom a cold bracing air is likely to agree.

*Chronic cutaneous Diseases.*—The use of mineral waters, in the form of baths and internally, is more likely to remove the majority of these diseases than any other means; and foremost among these must rank the more strongly impregnated sulphurous springs, as of Aix-la-Chapelle, Aix-les-Bains, Bagneres de Luchon and others in the Pyrenees, especially in diseases of long standing, as chronic eczema, psoriasis, impetigo, lepra, &c., where the circulation of the surface has been long in a torpid state. For those cases where there is a greater degree of excitability of the surface, as in prurigo, lichen, and other papular forms, baths of an alkaline or slightly mineralized thermal spring would be better suited, as Teplitz, Ems, Baden-Baden, Bath, Wildbad, Gastein, or Schlangenbad, with the internal use of these waters or of others which might be better adapted to remedy the disordered condition of the system, of which these eruptions are frequently only the manifestation. Thus in those which so often occur in the face, as the forms of acné, bathing in a spring of the above-mentioned kind, combined with drinking the water of Homburg, Rippoldsau, Kissingen, &c., will mostly remove or mitigate the disorder. The water of Harrogate is perhaps the one in England most appropriated to cases of this nature. In some of the more inveterate cases of cutaneous disease, particularly when of a syphilitic origin, Aix-la-Chapelle, Barèges, or mineralized mud-baths, would be more likely to prove effectual; as also in cases of chronic ulcers, fistulous sores, contractions of the limbs from wounds, or where foreign bodies, as musket-balls, remain lodged in the textures. These cases have, however, already been referred to in the preceding chapter.

*Chronic Discharges, &c.*—Leucorrhœa and other

functional derangements of the uterine system frequently depend upon disordered conditions of the constitution or of distant organs; and this point requires to be fully investigated before recommending any particular remedy. These disorders admit of cure, or of great alleviation, by the employment of mineral waters and baths combined in some cases with ascending douches. Half or hip-baths are likewise often extremely serviceable in cases where it would not be advisable for patients to go through a course of bathing, especially in profuse or painful menstruation, in which also the employment of gas-baths or douches is frequently attended with benefit. Where, on the other hand, a state of relaxation or debility keeps up the disorder, chalybeate baths are indicated. With respect to sterility, on which account recourse is so frequently had to mineral waters, its causes, which are various, must if possible be ascertained before recommending any particular spring merely because it happens to have a reputation, for most waters are praised by the resident physicians for their efficacy in these cases. In general, however, when there is much concomitant excitability of the system, with undue determination of blood to the pelvis, a bath like Ems or Wildbad would be most likely to be of service. On the other hand, when sterility is connected with an apathetic or atonic habit, torpidity in the performance of the functions, nervous debility from depressing moral impressions or serious illness, from general poorness of blood, or with local debility of the uterine system, there would be more probability of its being remedied by the employment of chalybeate springs, gas-baths, or other tonic means calculated to remove its causes.

Independently of their use in actual disease, mineral waters are often highly serviceable as a preventive means when there exists a disposition to disordered action, as evinced by feelings of general lassitude and indisposition, without the existence of any more tan-

gible symptoms, which is frequently the case in those who are engaged in the active occupations of life, from over excitation of the nervous system, especially if resident in a crowded metropolis. Elderly persons, or those whose powers are on the decline, will often be greatly invigorated by a course of mineral baths and waters. The warm saline or alkaline springs, Wiesbaden, Baden, Wildbad, Gastein, Bath, Schlangenbad, and others, will be serviceable in many cases, with the exhibition of a saline aperient or acidulous chalybeate: in other cases bathing in a chalybeate water would be more advantageous.

## CHAPTER VI.

## ON BATHING AND SEA BATHS.

THE practice of bathing and ablutions with water, to which reference is frequently made both in the Scriptures and by the ancient writers of various countries, has been followed not only as a hygienic and remedial means, but also in a religious point of view as typical of moral purity, and as such is continued to this day in eastern countries. The importance attached by the Greeks and Romans to bathing is sufficiently attested by the remains of the magnificent structures which still excite the admiration of the beholder, and by the beautiful specimens of fresco-painting and sculpture discovered in them. It is computed that in the baths of Caracalla, as many as three thousand people could bathe at the same time in water at various degrees of temperature, suited to their inclinations. The warm and hot baths were, however, almost exclusively in use under the emperors. A modern writer gives the following account of the use and abuse of baths among the Romans.

“During the republic the baths were cold. Mæcenas was the first to erect warm and hot ones for public use: they were called *Thermæ*, and were placed under the direction of *Ediles*, who regulated the temperature, enforced cleanliness in the establishment, and order and decorum among the visitors. Agrippa,

during the time he was edile, increased the number of thermæ to an 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. Adrian forbade their being opened before eight in the morning, unless in case of sickness; whereas Alexander Severus not only permitted them to be 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 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; 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 is no doubt that the substitution of hot for cold bathing, and the great abuse made of it, was a principal cause of the physical and moral difference between the Romans of the republic and the empire; and that it contributed, by its demoralising and enervating influence, to the production of various complaints unknown in the earlier periods of Roman history.

Wherever Rome extended her conquests, baths were established, of which numerous traces are to be seen at the present day, especially at several of the natural warm springs of Great Britain, France, and Germany.

In some northern countries, the use of hot baths,

\* On Baths of Mineral Waters, by John Bell. Philadelphia, 1831.

and especially of hot air and vapour baths, is excessively common among all classes. Of these I have given a brief notice in the Appendix, as connected with the practice of the cold-water cure; and have added some farther remarks upon bathing. The comparative neglect of baths in Poland is no doubt a principal reason of the greater prevalence of cutaneous complaints among the inhabitants.

Baths may be divided, according to their temperature, into cold, below  $65^{\circ}$  Fahr; cool, from  $65^{\circ}$  to  $77^{\circ}$ ; tepid, from  $77^{\circ}$  to  $90^{\circ}$ ; warm  $90^{\circ}$  to  $98^{\circ}$ ; hot, above  $98^{\circ}$ . No strict line of demarcation can, however, be drawn, as much depends upon individual peculiarities; and a bath which would be warm for one person would not be more than tepid for another.

The cold bath is generally used in warm weather, as a means of cleansing the surface, cooling the body, and of imparting tone and vigour to the system. It is in general well suited to healthy adults, and to those whose system is relaxed, without the existence of any disease. The duration of the bath must depend upon the circumstances and individual constitutions. Some persons may remain half an hour or longer in the water with impunity, provided they continue in motion. For others, a few minutes would be too long, and two or three plunges would be sufficient to induce a healthy reaction. It is not in general adapted to delicate females, to old people, or to young children; and though it has been by many considered as tending to strengthen infants and weakly persons, it is more likely to have a prejudicial effect, and several would fall a sacrifice before getting accustomed to it. In certain cases cold water is used for producing a shock or impression on the nervous system, as is daily seen in sprinkling the face of fainting persons, of hysterical women.

Tepid and warm baths act as a sedative upon the nervous system, allaying irritation, promoting a freer action of the exhalant functions of the skin, and de-

termining from internal organs, and thus preserving a due equilibrium of the circulation, and between the surface and internal parts. They are available at all times of the year, and are much more generally employed as a remedial means, than the cold bath, though their employment, both in acute and chronic disease, is much more restricted in England than in several continental states. They are, however, frequently used, in the practice of surgery, as a means of producing muscular relaxation as for the reduction of herniæ, and in spasmodic retention of urine; as also to allay the irritation induced by some diseases, as stone, and after operations.

However useful and recommendable the occasional use of the warm bath may be, a prolonged course of bathing would not be advisable, as it would tend to enervate and produce relaxation of the system, and would increase the susceptibility to cold; but this is not the case with mineral waters in general, in cases to which they are adapted, or water strongly impregnated with saline particles, as the sea. A tepid bath of common water will be of great service after much fatigue, travelling, in cases of sleeplessness, and general nervous irritability. It is also well suited to children whose skin is in a bad state, and in whom a tendency to convulsive affections exists, as also to several of the instances which I have enumerated in the preceding pages, under the heads of the slightly mineralized springs.

The hot bath, from its exciting property, is comparatively seldom employed in the practice of medicine. Some persons, however, who have an habitually cool skin and languid circulation, bear very well baths at a high temperature, and derive advantage from them. The hot bath is also sometimes advised as a revulsive measure, and in states of collapse, when the skin is cold and the powers of life are at a low ebb. Some of the continental mineral baths, as Mont D'Or, Teplitz, &c., are used at a very high temperature, with

advantage, in long standing rheumatic, paralytic, and cutaneous complaints.

The vapour-bath is usually taken in England while the person is standing, or seated, in an apparatus too well known to need description. Its action differs from that of the stufæ, Russian or Indian baths, by the lower temperature, and by the head being excluded from the vapour, which consequently acts merely upon the surface of the body, producing copious perspiration, whereas the former acts at the same time upon the whole pulmonary surface, and is much more generally exciting. In its general effects vapour has a very analogous operation with water baths, except that in the former the amount of sensible perspiration is much increased, and nothing is absorbed, whereas a person, after having been for a certain time in a water-bath, absorbs a greater quantity of fluid than he loses by perspiration, and would weigh heavier on coming out, than previous to the bath. Vapour-baths can also be taken at a much higher temperature than water-baths, owing to their medium being less dense. They are generally preferred in cases where a greater degree of relaxation of the surface is required, as in persons of dry skin and rigid fibre, affected with long-standing rheumatic and cutaneous complaints, neuralgia, and various other diseases. The vapour of several hot mineral springs is employed as a general or local bath, and also for inhalation, but though it may be slightly impregnated with gas, cannot have a very different operation from the vapour of common water.

The shower-bath, either cold or tepid, according to circumstances, is a valuable means of preserving the health, and of fortifying the system of nervous and delicate persons. It is likewise highly advantageous in remedying certain disordered states of health, in which an ordinary bath would not be applicable; as some cerebral affections, cases of nervous irritability with a tendency to spasmodic affections, sleeplessness, &c.

Local baths, as when the lower half or a part of the body is immersed in the water, are also of frequent use in the practice of medicine;—the former, or the hip-bath, is often of great service in cases of undue determination of blood to the head and upper parts of the body, with coldness of the extremities, and also in allaying irritation of the pelvic viscera, and equalizing the circulation between them and the surface. Foot-baths are also commonly used on the principle of revulsion, for the removal of colds, and slight inflammatory affections of the throat and air-passages. They, as well as hand-baths, are also very useful in febrile diseases, where the brain or the bronchial lining are congested, and when the palms of the hands and soles of the feet are hot and dry. Fomentations, which in fact, as well as poultices, are a local warm bath, may be used on such occasions.

Various fluids, as milk, broth, &c., are occasionally used as baths for their softening or nourishing qualities. Stimulating substances, as salt, mustard, and medicinal extracts or plants, are also sometimes employed for medicating baths. It is, however, foreign to my purpose to enter into the consideration of these as remedial agents.

Cold ablutions, though generally serviceable, should be employed with some precaution, especially in very young children who have not much reactive power. Daily sponging with cold water tends greatly to preserve the body in health, removes the disposition to catarrhal and rheumatic complaints, and prevents the accumulation of the cutaneous secretions in particular parts, which so often gives rise to disease. The addition of vinegar or salt to the water is often advantageous.

It has been said that absorption takes place in the bath; the extent to which this occurs varies greatly in different individuals and from various circumstances, as for instance when the atmospheric pressure is greater the absorption is increased, as also by the

motion and the shocks of the water upon the surface, which have an analogous effect to frictions : as regards the cutaneous exhalation this is diminished, but not suppressed, by the dense medium of the water ; the perspiration produced by a hot-bath is not equivalent to the vaporisation from the surface of the body exposed to the air.

The substances, also, which the water holds in solution in compound or mineral baths communicate special properties to the bath, alter its physical qualities, as the density, conductibility, electric state, and consequently its effects upon the organization, acting by their stimulating the skin, as well as by their absorption.

Baths of sea-water especially excite the skin and irritate its nervous papillæ, determining a more active circulation, and are very analogous in their action to some mineral springs containing a large quantity of muriate of soda, as Salzhausen, Kreutznach, Ischl, and Ashby de la Zouch. The quantity of saline substance varies considerably in different seas, and in the same sea at different parts, being greater at a distance from shore and in deep water than on the surface. In cold regions near the Pole, towards which a greater quantity of humidity is carried, the sea is less salt than in warmer latitudes, as near the equator, where the greater quantity of salt is said to be useful in preventing putrefaction. In the Baltic a pint of water contains scarcely two scruples of salt ; on the coasts of Great Britain it contains more than half an ounce ; and in the Mediterranean much more ; and in some parts under the Line the quantity amounts to more than two ounces. Besides muriate of soda, sea-water contains muriate of magnesia, sulphate of soda, and other salts in minute proportion, as well as iodine, bromine, and animal and vegetable matter.

From the beginning of July the temperature of the sea is constantly on the increase, and during the month of August it is at the highest, remaining the

same with very little alteration till September, when the temperature again becomes less. The minimum temperature of the sea for each day is in the morning before ten o'clock, its maximum from twelve to five. Other circumstances being the same, the temperature of sea-water is observed to be higher in proportion to the proximity of continents and islands.

Tepid bathing in sea-water is useful in several chronic complaints, when a slightly stimulating action on the skin and nervous system is required. The effects from absorption of the water have also to be considered. It may be continued for a long time without inducing the relaxation which is caused by frequent bathing in common warm water, and is not unfrequently recommended as preparatory to bathing in the open sea, in which not only the stimulating effect of the saline substance is to be considered, but also the mechanical action and pressure of a large body of water, the motion of the waves, which, by their mass and the force with which they act, may be regarded as general douches, and are often not well supported by weakly persons and delicate children.

On entering the water at its natural temperature, a feeling of shivering, with slight oppression of the chest and convulsive respiration, termed the shock, is experienced, which, however, is but momentary, and passes off on immersing the whole of the body and moving about freely. After the bath, a greater or less degree of reaction ensues, indicated by a genial glow, increased redness of the surface, and a feeling of general vigour, with, in some cases eruptions on the skin.\* The object of sea-bathing is to induce this reaction, whence its tonic properties; the direct action of cold having a sedative and benumbing influence, depressing the powers of life, and, when pro-

\* These eruptions are sometimes in the form of red patches like those of measles, with vesicular elevations; sometimes they have the diffused redness of scarlatina, at other times resemble prurigo, or the spots of fleabites; even both are sometimes produced.

longed, causing the blood to retire from the surface, and congesting internal organs, thereby inducing coma, and subsequent death. Thus, it will be obvious, that the period of the cold-bath should not be too much prolonged; and also, that a certain degree of vigour and power of reaction is requisite in those to whom the cold sea-bath is recommended. It is consequently not advisable for very weak or delicate subjects, old people, or those disposed to internal congestions or hæmorrhage. The first baths mostly occasion a certain degree of general lassitude with tendency to sleep, especially after meals; some complain of oppression in the precordial region, of headache, of a tendency to toothache, &c., an attack of which is frequently induced by the bath; the uterus and breasts are more sensitive, the appetite increases, and constipation is frequently produced. These effects, however, afterwards subside.

Cold sea-bathing acts, therefore, powerfully on the nervous system, invigorating body and mind, and increases the activity of particular organs, especially the skin, the respiratory apparatus, the lymphatic glands and absorbents, the liver and abdominal circulation. It may be recommended in states of general languor, lassitude, and debility, either from excesses, dissipation, or tedious convalescence; where there exists a preternaturally delicate state of the skin, with susceptibility to take cold, or a relaxed state of the mucous membranes; in constitutional, general, or local debility, as of the sexual organs, and scrofula, provided there be no feverishness or other counter-indicating circumstances, and in various nervous and other affections, where a tonic medication is indicated. "Affusions of sea-water upon the head, with immersions in the sea, are highly beneficial in neuralgia of the head, obstinate headache, or hernicrania. The combination of the two modes is indispensable, for either employed separately will increase

the pain, or reproduce it. An attack of neuralgia may be arrested by a sea-bath." \*

Independently, however, of bathing, a residence at the sea-side is beneficial in several states of disordered health; as dyspepsia, bronchial affections, a disposition to consumption or scrofula: increased nervous susceptibility, as in hysterical and other nervous affections, (which are less prevalent on the coast than in the interior,) the sea-air being not only comparatively free from fogs and vapour, but also strongly impregnated with saline particles, which tend materially to impart tone to the system, as is evident from the strong constitutions and good appetite generally enjoyed by sailors and residents on the coast.

\* Gaudet. Effets Physiologiques des bains de mer.

## CHAPTER VII.

## ON ARTIFICIAL MINERAL WATERS.

THE acknowledged power and efficacy of mineral waters in the treatment of chronic disease have at different periods occasioned attempts to imitate them, with a view to render this class of remedies of more universal application; but these imitations, owing to the imperfect knowledge of the chemical composition of the natural springs, and the want of proper apparatus, could scarcely be said to bear a resemblance to them in their properties and mode of action, till the period when Dr. Struve, by unremitting perseverance, and at considerable expense in the construction of the requisite apparatus, succeeded in bringing artificial mineral waters to a high state of perfection, so as in many instances scarcely to be distinguished from the natural ones; and the beneficial effects resulting from the use of these waters at Dresden, soon gave rise to the formation of similar establishments in other cities of the continent, as Leipsic, Berlin, Petersburg, Moscow, Warsaw, Königsberg, Riga, Odessa, Copenhagen, Stockholm, which are annually frequented by numerous patients.

In the preparation of these compounds a complicated apparatus is required; to maintain in the waters the requisite degree of saline and gaseous impregnation, the proper degree of temperature, &c., a

small thermometer is inserted in each water, and a person is constantly on the watch, to see that the temperature does not vary from that of the natural spring. Distilled water only is used, and the best analyses are so closely followed, that even minute portions of inert substances, as silex, are not omitted, as Struve justly observes in his work. "In a mineral spring, no constituent part is indifferent, and the smallest has its share in the general action, although it may, in itself, apparently possess no power."\* It is not unfrequently seen with respect to pharmaceutical preparations, that when the supposed inert parts have been abstracted, the remedy is less efficacious than before.

Most unprejudiced persons acquainted with mineral waters admit, that as far as sensible properties are concerned, there is no material difference to be detected between many natural springs and their prototypes. I have not had an opportunity of comparing the two

\* Ueber die Nachbildung kunstlichn, und naturalichen Heilquellen. Struve was led to direct his attention to the formation of artificial waters by the circumstance of his being subject to hemorrhoidal attacks, for which he was accustomed to have recourse to the German mineral springs; but in the spring, when he most required them, these waters could not be obtained fresh in Sweden; he therefore set about investigating more closely their composition, in order to be able to prepare analogous compounds, and after several years' experience of their effects, as well as from that of other experienced physicians, he deduced the following conclusions:—

"1st. The waters prepared by me do not differ from the natural ones in the properties which are perceptible to the senses, viz. the taste, odour, temperature. Nearly half of the number of persons who have taken my waters are well acquainted with the natural ones, and they have the full conviction that as respects the above-mentioned properties these waters are not different, and most of them believe that as regards their action there is great analogy between both kinds.

"2. The immediate action of my waters upon those using them in the establishment has been very much the same as that of the natural ones, both as regards the general operation which the waters have on most drinkers during the course, as well as in that which is produced by individual peculiarities.

"3. The similarity of my artificial with the natural waters is further proved by their after-operation, (*Nachwirkung*,) the same effects frequently occurring in both instances, weeks or months after the termination of the course."

kinds of waters together at the same time, but as far as my recollection of the taste, smell, &c., of some of the principal ones, as Carlsbad, Kissingen, &c., serves me, I should say that the difference in these respects is very slight. The majority of physicians at the various baths, however, who are naturally strongly opposed to artificial waters, assert that even though there may be no very perceptible difference in their physical properties, yet the natural springs are much more efficient in their action on the economy; which, however, in the present state of matters, it would not be easy to ascertain, as no accurate statistical information of the effects of the natural springs can be obtained, owing to the partial statements put forth in favour of the individual springs, while seldom is any report made of the unfavourable cases. Several German practitioners of eminence, as Doctors Von Ammon, Hedenus, Horn, Kreysig, Rust, &c., who have had frequent opportunities of testing the merits both of natural and artificial waters, are of opinion that, looking to the water alone, with regard to its internal administration, the artificial are equally efficacious with the natural waters; whereas other practitioners whose names stand equally high with the preceding, as authorities on mineral waters, as Hufeland, Osann, Carus, Wetzlar, &c., consider the former to be inferior to the latter, though they allow that they have great analogy with them, may be regarded as an efficient substitute, and are well calculated to render great service in the treatment of chronic diseases.

Some of the artificial mineral waters are better adapted for being sent to a distance than the natural ones—especially such as contain a large proportion of carbonic acid and iron. Chalybeate waters exported far from the spring, or if kept long, become decomposed and the iron is precipitated; but it remains longer in suspension in the artificial waters. Those of Spa and Marienbad, which I took for the purpose

of examination from the establishment at Brighton, retained their taste, and a considerable proportion of their gas, for several hours, though left exposed to the air in uncorked bottles. It was not till about twenty hours after being taken from the pump, that the iron of the former became precipitated, and, on agitating the bottle containing the latter, a considerable portion of carbonic acid was evolved. The Seltzer water appeared to me to resemble least the natural spring, from its being too much charged with carbonic acid; on allowing part of the gas to escape, its taste approximated somewhat nearer, but was still very different from the real water. Osann made the same remark with respect to the Seltzer water of the establishment at Berlin, as being too exciting for irritable subjects; and in fact, from being so strongly charged with gas, it approaches nearer to the Eau de Seltz of the Parisians—or the soda water of the shops, which, however pleasant as a beverage, and useful for the correction of acidity in wines, &c., cannot be looked upon in the same light as the natural water in a medicinal point of view.

Among the arguments which have been adduced in support of the opinion that the artificial waters cannot be regarded as analogous with natural ones, are, 1st, that new elements are frequently detected in mineral springs, of the existence of which no idea was entertained in former times, and that there is a great probability that other constituent parts would be discovered were the science of chemistry in a more advanced state. 2ndly. That the state of admixture of the various component parts is more intimate in natural springs. 3rdly. That the heat of thermal springs, being probably of volcanic origin, has a different action on the body than heat artificially produced. 4thly. That a peculiar substance of an animal nature, evident to the taste and smell, exists in several natural springs, which is not discoverable by chemical analysis, and which is absent in the imitations of those springs.

5th. That mineral springs, especially thermal ones, have a living property, and frequently produce effects on the animal economy which cannot be accounted for by their component parts, the quantity of which is often very minute. On the other hand, it is asserted that the mixture of the component parts of artificial waters is as intimate as in natural ones; and when no perceptible difference exists in the sensible and physical properties of both kinds, it may be inferred with reason, that the effects would be the same; that some natural waters vary considerably at different times, and are affected by various circumstances, as the state of the atmosphere, rainy or dry weather, &c., whereas artificial waters are the same under all circumstances; that in some springs the composition has been different at different periods, and yet they are recommended in the same diseases.

Hertz remarks on this point, "The second edition of Heidler's book (on Marienbad) recommends the waters in the same class of complaints as the first edition, published in 1822; though it is well known the springs underwent considerable alteration in their composition between these periods: and also that the taste of many springs varies in different weathers. Westrumb found in a spring at Pyrmont twenty-nine grains of solid substance, whereas Gmelin found, the previous year, only eleven; and the Trinkquelle yielded in different months of the same year, at one time a hundred and twenty-two, at another only thirty-seven, and at another time a hundred and eleven grains of solid substance."\*

Again, it is said that the living power of mineral waters and the peculiarity of their caloric are purely hypothetical, and have been disproved by experience; but even were these positions admitted, it is in the form of bath that their action has been considered to be principally manifested. The same author I have

\* Die kunslichen Mineral-wasser in ihren Verhaltnisse zu den naturlichen. Berlin.

quoted says, "Let any one point out to me a single spring without gas and mineral constituents, which, by its internal employment alone, has a more powerful action than that of common boiled or distilled water, and I am very ready to give up my view of the case." The effects of natural and artificial waters are also said to be similar, by persons who have employed both kinds; and the after effects or crises occurring subsequent to the employment of the natural, have been likewise also experienced from using the artificial, Carlsbad water.

The following case, in illustration of the identity of effects of the natural and artificial waters, is related by Dr. Schmaltz of Dresden, and is given in Vetter's *Brunnen und Bade-Buch*, whence I have extracted it.

"A patient, subject to rheumatic attacks, laboured also under obscurity of vision of the left eye, from opacity of the lens. The sight of the left eye likewise began to be affected,—there were present symptoms indicative of a congestive state of the abdominal venous system,—constipation, headache, pains in the loins, and piles. After he had drank for a week the water of the Mühl and Neubrunnen, his physician was astonished to find that he had a decided attack of jaundice, the eyes being of a dark yellow colour, and was apprehensive of the existence of serious disease of the liver; but the patient, smiling, allayed his fears by informing him, that on account of this very circumstance, he had a greater degree of confidence in the artificial waters; as, on two former occasions, at an interval of several years between each, he had drank these two springs at their source in Carlsbad, and, on each occasion, on the fifth day of drinking he had been attacked with jaundice; the attacks having subsided after three weeks' use of the water, leaving his general health much improved. This also proved to be the case on the present occasion from the use of the artificial waters."

The softening of recently fractured bones, which has occurred from the use of the Carlsbad springs, has also taken place on two or three occasions during the employment of the artificial Carlsbad. One of these cases is related by Rust; the patient had some time before fractured his arm and forearm: in the third week of drinking the artificial Carlsbad water, the bones became soft, and the arm pliable as wax, requiring the support of splints. A circumstance likewise occurred to Dr. Hille, the author of a work on mineral waters, who fractured his leg; the fracture had united badly, leaving a thick bony ring on the surface of the tibia, perceptible both to the sight and touch. Seven years afterwards he drank the artificial Muhlbrunnen, for rheumatic pains, and was surprised to find that not only the pains disappeared from the use of the water, but also that the bony prominence had so far diminished as no longer to be perceived by the eye.

Admitting, however, the analogy of the composition and effects of natural and artificial waters in many instances, the use of the latter must be restricted to their internal administration, as baths would be both difficult to obtain, and expensive; whereas, in a large proportion of the cases in which the greatest benefit is obtained from mineral waters, bathing is the most essential part of the treatment. This is especially the case at most thermal springs, several of which, being but slightly mineralised, are exclusively used for baths; and even when the internal use of a mineral water is more especially indicated, bathing may frequently be advantageously combined with the drinking. On this account, then, even were there no other reasons, the natural springs are infinitely to be preferred by those who have the choice. Rust, it is true, in alluding to the slightly-mineralised springs, states a case in which he considered baths of distilled water were as efficacious as those of Gastein would have been; but as the particulars of the case are not given,

it proves nothing, even supposing that any impartial judgment could be formed upon one, or upon a few isolated cases. It is well known that the effects produced by these and some other slightly mineralised baths have not been hitherto satisfactorily accounted for, though their high temperature and elevated position are no doubt principally instrumental in the cures which they have effected; as the influence of climate, locality, &c., of a spring upon mind and body, have to be considered, as well as the physical and chemical properties of the water, in estimating the results of a course of mineral waters. "An artificial mineral water," says Löwig, "drank on the Alps, would have a different operation from that which it would have, if taken in Berlin; and where the springs of Pfeffers to rise in the grove of Luneburg, they would certainly not have the same reputation which they now enjoy."\*

Natural mineral springs have also an advantage over artificial waters, in most instances, in being favoured by auxiliary circumstances calculated to promote the restoration of health. Thus, the journey to the springs; the change of air and scene; the beauty of the scenery, and interesting environs of most of them; the temporary freedom from cares and annoying avocations; the early rising and exercise in the open air, are circumstances of great importance in assisting the action of the waters, and in several of the slighter ailments would probably alone suffice to rectify the deranged condition of the system; but, on the other hand, in many of the worst cases, where these circumstances can have no influence, the beneficial effects are solely to be attributed to the action of the waters,†

\* Schwartze Heilquellenlehre. Leipzig, 1839.

† Artificial waters afford one of the best tests of the efficacy of natural ones, inasmuch as these extrinsic advantages to which the entire benefit is ascribed by some persons, cannot have any effect inasmuch as most of those who drink the former continue their usual mode of living and avocations.

When drinking is the more essential part of the treatment, artificial waters have, in some respects, the advantage over natural ones, such as being available during the greater part of the year, instead of their employment being restricted to a few months in the summer, as is the case at the various baths: they may also in some cases be used as a preparatory measure, or subsequent to the use of the natural springs. Several of the most powerful waters being collected together in one establishment, if one which appeared to be indicated did not suit, recourse might be had to another; at all events, the disappointment would not be so great as where a person had been induced to make a journey of several hundred miles to a spring, and found it unsuited to his case; a circumstance of not unfrequent occurrence, and often depending upon the adoption of the advice of those who are but little acquainted with the properties and effects of the different springs, or who are prejudiced in favour of particular ones; though it must be admitted that patients occasionally suffer disappointment from the difficulty which even experienced practitioners have in forming an opinion, in obscure chronic cases, as the means most likely to be of service; from the intractableness or incurability of the complaints; from the idiosyncrasy of individuals, &c., in consequence of which the effects of a mineral spring cannot always be estimated before trial has been made; as is likewise seen to be the case with many remedies in the ordinary practice of medicine, when medicines apparently indicated disagree, or do not produce the effects anticipated.

Some persons are accustomed, in order to increase the activity of natural and artificial waters, to add salts or other substances to them. I have already attempted to show, in a former part of this work, that such additions are with a few exceptions prejudicial, and calculated to prevent the proper mode of action of these remedies. The same remark will apply to

the combining together two kinds of mineral water, as Carlsbad with Ems, the latter with Marienbad, Pyrmont, &c., by which it is said peculiar changes and modifications are induced, in the constituent parts, and fresh compounds, not found in nature, are formed, which may be made to answer particular indications. This admixture may be advisable in some few instances, but in general it is not so, for if any one will refer to the analysis of an efficient mineral spring, as Carlsbad, he will find a quite sufficient number of medicinal substances, for all practical purposes, without the necessity of adding as many more by the admixture of a different kind of water; though it is true that by this means the activity of the compound upon particular organs may be increased. This, however, is not what is usually required in a course of mineral waters, and the practice of administering the artificial ones in such a manner as to produce sensible effects at the time, has occasioned some of their advocates to say that they are even more active than the natural springs; but if merely active effects upon particular organs be required, a mixture from a druggist's would answer the purpose just as well; and as Osann has justly remarked, in reply to such as advocate the superior activity of artificial waters, "Though it may prove the power of the artificial waters, it speaks directly against the identity of their action with natural ones."\*

Some of the natural springs are better adapted for imitation than others. The waters of Pullna and Saldschütz, which can scarcely be regarded as springs, but which percolating through the soil of a particular district, and becoming strongly impregnated with the salts with which it abounds, are collected in pits dug for the purpose, and which are actively purgative, are perhaps in no wise superior in point of medical efficacy to the artificial ones. The artificial Carlsbad water is

\* Darstellung der bekannten Heilquellen, &c. Berlin, 1840.

also one of those most frequently used, and is very analogous in its operation to the natural springs. The Marienbad and Kissingen imitations also produce similar results in many instances, though, at the springs themselves, bathing frequently forms part of the treatment, and is of material assistance to the internal use of the water. On the other hand, sulphurous or saline springs, as Aix-la-Chapelle or Wiesbaden, are not calculated for imitation, as bathing forms the more essential part of the treatment in most of the cases which these springs are likely to relieve; the same may be said of Kreutznach, though at Brighton the sea-water would not form a bad substitute for these baths, combined with the internal use of the artificial Kreutznach water.

The following are the waters manufactured in the establishment at Berlin; the number of the patients averages about 600 annually.

Four of Carlsbad; viz. Sprudel, Muhlbrunnen, Neubrunnen, and Theresienbrunnen. Two of Ems, the Kranchen and Kesselbrunnen. The Grande-Grille of Vichy; the Kreutzbrunnen and Ferdinandsbrunnen of Marienbad; the Hauptquelle of Pyrmont; the Poubon of Spa; the Franzquelle and Salzquelle of Franzensbad; the Obersalzbrunnen; the Ragozzi of Kissingen; the Adelheidsquelle of Heilbronn; the Elizabethquelle of Kreutznach; the waters of Pullna, Salschutz, and Selters. The Brighton establishment possesses, in addition to the above named, the Saratoga water.

I cannot better conclude this chapter than in the words of Dr. Kreysig. "I must again express my conviction that the mineral waters, as prepared by Dr. Struve, are extremely active remedies, and very excellent imitations of nature; and I consider his discoveries in this important branch of *Materia Medica* as a great benefit conferred upon humanity."



## NOTES

### ON SOME CONTINENTAL CLIMATES.

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THE following notices of the climates of some of the winter places of resort in the south of Europe first appeared in a work which I published upon France, Italy, and Germany, about five years ago; but as climate is a powerful auxiliary to mineral waters in the treatment of many chronic diseases, it may be useful to append them to the preceding pages.

*Nice.*—This town and neighbourhood have long been resorted to by invalids for the sake of the winter climate, which differs materially from that of Provence, and the South of France; inasmuch as it is, in a great measure, sheltered from the *vent de bisé*, or mistral, by the maritime alps, on the north and north-east, and by the Estrelles, which terminate at the sea, on the west; but still it is liable to cold winds and the atmospherical transitions which render a residence in Italy dangerous to invalids; hence much discrimination is required in the selection of the cases likely to be benefited by its climate, as well as regards the proper period of residing there. The rainy season is generally over at the time when strangers begin to arrive, and the months of November, December, and January, are usually fine and warm, the temperature being seldom lower than  $45^{\circ}$  in the day-time, and sometimes as high as  $60^{\circ}$  in the shade. The sky is mostly cloudless, of a deep blue colour, and the sun is extremely powerful in the

middle of the day, when the Nissards generally remain within doors. The atmosphere is light, dry, and exciting, and is consequently suited to individuals of a torpid or relaxed habit. Cold winds sometimes occur in these months, but are most severely felt in the spring, when they blow sharply from the east over the mountains, at that period covered with snow. In the spring also the sun acquires great power, rendering the climate extremely trying to invalids, especially to those labouring under disease of the lungs or air-passages.

According to Sir J. Clark, the mean winter temperature is  $48^{\circ}$ , being  $9^{\circ}$  warmer than London,  $1^{\circ}$  colder than Rome, and  $10^{\circ}$  colder than Madeira. The daily range of temperature is less than any other part, and in steadiness of temperature it ranks next to Madeira.

I perfectly agree with Sir James in the opinion that Nice is not suited for the winter residence of consumptive patients, or those in whom there exists much irritability of the air-passages. The air is too sharp and exciting, and the occasional cold winds are severely felt. Those persons, however, in whom there exists a predisposition to consumption, or even those in the earliest stage of the disease, will often derive considerable advantage from passing November, December, and January, at Nice, provided there be not much acceleration of pulse or cough. The climate is generally of great service in chronic bronchial disease, particularly the catarrhal affections of elderly people, attended with copious secretion of mucus, and in those forms of asthma where there is little tendency to inflammatory action. I have known some persons labouring under those complaints who have passed several successive winters at Nice. Patients with chronic gout, rheumatism, and paralysis, (the latter when not from apoplectic attacks,) as well as those whose general health has become deranged by a residence in tropical or unhealthy climates, will

in general derive benefit from wintering at Nice; as will also many nervous, hypochondriacal, and scrofulous patients, and those of a cachectic habit of body, with a languid circulation. Several of these cases will be likely to derive much more advantage from climate by the previous employment of mineral waters; the combination of these means, offering, in my opinion, the greatest probability of cure and amelioration in long standing disordered states of the health, where a generally alterative and renovating treatment is indicated. I have, during several years, been in the habit of recommending invalids, especially those with pulmonary complaints, to leave Nice before the middle of February, about which period inflammation of the lungs and bronchia is very common among the inhabitants, and several persons, by remaining throughout the spring, have lost the advantage which they had gained during the preceding months.

Nice frequently disagrees with healthy persons of an irritable or plethoric habit, inducing headache or derangement of the digestive organs. The diet, both of invalids and those in health, will require particular attention, as several articles which agree very well in England, not unfrequently disagree with people at Nice. Wine, in particular, should be taken very sparingly. Those who remain during the spring should avoid exposure to the sun's rays, by remaining within doors in the middle of the day, or by carrying an umbrella, as there are no shady walks in the immediate vicinity of the town.

*Pisa.*—Pisa enjoys, next to Rome, the mildest and most equable winter climate in Italy. The air is less dry and sharp than that of Nice, but less soft than that of Rome. It is not so liable to great and sudden variations of temperature as Florence and Naples. Cold winds are, however, frequently severely felt, particularly in the early part of the spring. Sir J. Clark says, that the quantity of rain which falls during the year at Pisa is nearly as great as in

Cornwall. It must, however, be borne in mind, that as the rain falls in large quantities at a time, the weather is less variable, and long periods of fine weather intervene. The heat of the sun is, at times, very great in winter and spring, causing a difference of temperature, of several degrees, between the Lung 'Arno, and other parts of the town less sheltered from cold. Persons disposed to phthisis, and those suffering from laryngeal and bronchial affections which simulate that disease, generally derive permanent benefit from wintering at Pisa; gouty and paralytic patients would likewise frequently derive benefit from the climate. Pisa, is, however, a dull residence, from its possessing none of the resources of a capital; its comparatively depopulated appearance, and also from the invalids there congregated. For those who require more amusement, and are able, without danger, to partake of it, Rome is preferable. Many, however, find Pisa agree better with them than the more relaxing climate of Rome. It suits well some asthmatic invalids, and others whose general health is deranged without the existence of any evident local disease, as is not unfrequently the case with those who have resided in unhealthy climates.

*Florence.*—The winter climate of Florence is not suited to invalids. The weather is much colder than at Rome or Pisa; the transitions of temperature are great and sudden, and rain frequently falls in torrents. According to the statements of Mondat, the following is the average proportion of rainy to fine days, from observations made during seven years.

Fine days in the year	.	.	.	.	160
Rainy days	.	.	.	.	110
Variable	.	.	.	.	95
					<hr/>
					365

From eighteen to twenty inches is the average quantity of rain which falls in a year \*.

\* Topographie Médicale de Florence.

The tramontane (which is analogous to the *vent de bise* of Provence) sweeping over the Apennines is sharp and piercing, while at the same time the heat of the sun is often inconveniently felt in some parts of the city. Thus in less than a minute the change from summer's heat to winter's cold may be experienced, rendering the inhabitants more susceptible to inflammatory attacks on the lungs and air-passages, than those living in a climate uniformly cold.

From the end of November to the middle of March, the climate of Florence is less adapted than any other in Italy to persons labouring under pulmonary, bronchial, or rheumatic complaints. It generally agrees with dyspeptic and nervous patients who seek mental recreation; and I have known it suit some patients with nervous asthma, better than any other Italian town. Such individuals should reside in that part of the city north of the Arno. The best situations are the Lung'Arno, the Piazzas Santa Trinita, Santa Maria Novella, and the adjacent streets. The Via de' Servi, and others in the neighbourhood of the cathedral, have some good houses; but this situation is colder. The best street on the southern side of the river is the Via Maggio, leading to the Porta Romana.

The weather in October and November is usually fine and warm. Invalids, on their way to winter at Rome, will frequently benefit more by remaining these months at Florence, than by proceeding at once to Rome. They should not return to Florence before April, at which period the weather is in general delightful.

*Rome.*—The climate of Rome is milder, and the winter shorter and less severe, than in other parts of Italy. The air is soft, but at times oppressive, and is very apt to cause depression of the spirits in healthy persons. Its mean winter temperature, according to Sir J. Clark, is  $10^{\circ}$  higher than London,  $7^{\circ}$  higher than Pau,  $1^{\circ}$  higher than Nice. In spring

it is  $9^{\circ}$  above London,  $3^{\circ}$  above Pau,  $1^{\circ}$  above Nice,  $1^{\circ}$  colder than Naples, and  $4^{\circ}$  below Madeira. Sir James states also that, with respect to steadiness of temperature from day to day, Rome precedes Naples and Pau, but comes after Nice and Pisa; that a third more rain falls at Nice, but it is considerably drier than at Pisa. A frequent cause, however, of dampness at Rome is the stagnation of the air, and the exhalation from the earth after sunset, of which foreigners are sometimes very sensible. The difference in the temperature of the air is also very marked, within the short space of half an hour at this time of the day; consequently strangers, but especially invalids, should always be provided with an extra garment to put on when out of doors. From the tables appended to Sir J. Clark's work, it appears that more rain falls throughout the year in Rome than in London; the mean quantity being 31 inches in the former, and 24 in the latter: the number of days on which rain falls in London on an average throughout the year is 178, while at Rome it is only 117; but it must be borne in mind that small quantities at a time, or showers, are very common in England, while at Rome the rain more frequently falls violently and at particular seasons, leaving a longer interval of fine weather. About the same quantity of rain falls at Florence as at Rome, though from the comparative stillness of the Roman atmosphere, and from that of Florence being frequently agitated by winds, the climate of the latter city is not oppressive like that of Rome, which not unfrequently disposes to melancholy and nervous affections after a prolonged residence, but more especially during the prevalence of the sirocco wind, which, however, agrees very well with the majority of the Romans, and with many invalids. The tramontana sometimes prevails during several days in succession, and affects persons prejudicially so much the more easily from the previous mildness and relaxing quality

of the air. Both invalids and people in health should take proper precautions against the great and sudden transitions of temperature which are invariably experienced in going from the open air when the sun is shining into the cold picture or statue galleries or churches. Dr. J. Johnson observes, with respect to these great transitions of temperature, "The very circumstance which forms the charm, the attraction, the theme of praise in the Italian climate, is that which renders it dangerous, because deceitful; viz.—the long interval of fine weather between vicissitudes of great magnitude. This is the bane of Italy, whose brilliant suns and balmy zephyrs flatter only to betray; they first enervate the constitution, and when the body is ripe for the impression of the tramontane, that ruthless blast descends from the mountains on its hapless victims." As regards healthy persons, a long residence in Italy, especially at Rome, or even returning thither, during several successive winters, does, in many cases, materially impair the health—frequently without the cause being suspected; or, at all events, enervates the constitution, diminishing the vigour of the body and the energy of the mind. Many people, after two or three months' residence at Rome, feel themselves relaxed and out of health; this indisposition may generally be removed by an excursion for a fortnight or three weeks to Naples or Florence.

On the whole, Rome may be considered as the best residence in Italy for patients labouring under consumption, though in the advanced stages little benefit can be expected; and since the climates of the South have been better understood by the profession in England, the number of those who have been sent out while labouring under irremediable disease is much less than formerly; and comparatively few invalids now resort to Rome, the great majority of the English being composed of families, and travellers for pleasure. In the tendency to consumption, and in the early stage of this disease,

much advantage may, however, be frequently derived from wintering at Rome, for two or three successive years; but persons similarly circumstanced should not, in general, remain throughout the summer in Italy. In some cases Pisa agrees better than Rome, in others Nice, especially when the complaint is of a scrofulous origin, and the patient is of a torpid or phlegmatic temperament, marked by a slow, languid circulation; whereas in the opposite condition, which is characterized by a florid complexion, accelerated circulation and respiration, Pisa or Rome would be preferable. In some bronchial and laryngeal diseases, which are not unfrequently mistaken for disease of the lungs, and which, in fact, frequently superinduce disease of these organs, the climate of Rome will produce permanently beneficial effects, and will often contribute materially to their removal. Those cases marked by a tendency to inflammatory action, or accompanied with much local irritability, are in general the best adapted for Rome; while those chronic forms, especially in old people, attended with free expectoration of mucus, will often derive more benefit from Nice or Naples; though they would do well to remove from these localities in the spring. Many dyspeptic, rheumatic, and gouty invalids, especially if of an irritable habit, will likewise derive benefit from passing the winter at Rome, or between Florence, Rome, and Naples. Rome generally agrees well with elderly people, and many attain there a great age. It does not in general suit patients with neuralgic or nervous affections; neither would a prolonged residence be advisable for those liable to cerebral congestion.

*Naples.*—The climate of Naples, though perhaps the driest in Italy, is at times exceedingly changeable with respect to variations of temperature, which are often great, frequent, and sudden. Cutting winds often prevail, especially in spring. The part of the city termed the St. Lucia, which is inhabited by a

large proportion of the visitors, is particularly exposed to their influence, while at the same time the sun has great power, and renders invalids extremely susceptible; persons, therefore, with disease of the lungs and air passages, or rheumatism, should not remain at Naples during February and March. During November, December, and the greater part of January, the weather is usually fine and mild. The climate does not generally disagree with dyspeptic and nervous patients, unless there be a high degree of excitability; and those whose general health is disordered, without any palpable disease, may usually pass the winter very well at Naples; which, however, is frequently found to be too exciting for gouty patients of an irritable or plethoric habit. The sirocco is more severely felt than elsewhere in Italy; and by its relaxing and paralyzing influence renders persons incapable, during its prevalence, of mental or bodily exertion. After the month of April, the heat in the middle of the day is so great, that few persons are to be seen in the streets till the evening, most of the Neapolitans being engaged at that hour taking their siesta.

*Pau.*—This is the only locality in the south of France which could be recommended to invalids as a winter residence, for which it offers many inducements. The population of the town is about 12,000. Its position is beautiful, the houses and accommodations are good, and provisions of all kinds are abundant. The climate is humid as compared with that of Provence, but drier than other towns of the southwestern part, on account of its more elevated position, and from the gravelly nature of its soil. Sir. J. Clark says in reference to it, "Calmness is a striking character of the climate, high winds being of rare occurrence and of short duration. The mean annual temperature is  $4\frac{1}{2}^{\circ}$  higher than that of London,  $5^{\circ}$  lower than that of Madeira; but in spring Pau is  $6^{\circ}$  warmer than London, and only  $2\frac{1}{2}^{\circ}$  colder than Mar-

seilles and Rome. The daily range of temperature is  $7\frac{1}{2}$ , at Nice  $8\frac{1}{2}$ , at Rome  $11^{\circ}$ . The number of days on which rain falls is, on an average, 109 in the year—nearly the same as at Rome, and about 70 less than at London: the west wind blowing directly from the Atlantic is accompanied with rain. The westerly or Atlantic winds are most prevalent; the north wind blows feebly and is not frequent. Rain seldom continues for more than two days at a time, and the ground dries rapidly; the atmosphere, generally speaking, is free from moisture. The circumstances which render Pau eligible for some invalids are, that the atmosphere, when it does not rain, is dry, and the weather fine. There are neither fogs nor cold piercing winds, and the mildness of the winds is characteristic, and is consequently favourable in chronic affections of the larynx, trachea, and bronchia. In gastritic dyspepsia, and some kinds of asthma, it is also beneficial, but it is prejudicial in bronchial disease, accompanied with much general relaxation, copious expectoration, and dyspnoea, and is too changeable for consumptive diseases." Some gouty patients would also derive advantage from wintering at Pau, especially after a course of mineral baths in the summer.

## THE COLD-WATER CURE.



THE  
COLD WATER CURE.

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THIS method of treating diseases, which of late years has been so greatly in vogue in Germany, had been scarcely heard of in England, until the publication of the brief account which I gave of it in an appendix to my work on the baths of that country.

Its originator, Vincent Priessnitz, a small farmer of Graefenberg, near the little town of Freywaldau in Silesia, having, it is said, accidentally had his finger crushed when young, immediately put his hand in the water of a neighbouring fountain, and not only found that the pain was instantly relieved, but also that the part healed with very little difficulty. On the occasion of two or three other accidents which he subse-

quently met with, he employed cold water with a like success, and having a sick cow he applied cold affusions while the animal was in a state of copious perspiration, from which time it got rapidly better and recovered. He was likewise induced to recommend the same remedy to persons residing in the vicinity, and in a short time the report of the benefits said to have been derived from the method so extended its fame, as to cause invalids from distant parts to resort to Graefenberg for the purpose of undergoing the treatment. Considerable opposition, however, was made on the part of the local authorities, before whom Priessnitz was cited to appear, and his practice was prohibited; but he appealed from the decision to a higher tribunal, and on proving that he did not employ any secret remedies, but simply pure spring water, he was authorized to receive patients to be treated according to his method; Graefenberg was ranked among the number of Austrian baths, an inspector was sent from Vienna to superintend and report upon the proceedings of the establishment and the advantages of the treatment. The government of Bavaria and other German countries, likewise authorized and protected the practice.

The house at Graefenberg was built in 1824, on the acclivity of a wooded mountain, on which nu-

merous walks were cut ; but as it was soon insufficient to receive the numerous invalids, two other houses were added, and the houses of the villagers were put into requisition for lodging-houses, into which the water from the stream flowing through the meadow was diverted to serve for the supply of baths. The rapid increase of the repute of the treatment may be estimated, by the increased number of patients, which in the season of 1830 amounted to only fifty-five, but in 1838 to upwards of eight hundred—among whom were several medical men—and last year, to one thousand five hundred. Other establishments likewise arose in various parts, many of them being under the superintendence of physicians.

One of the largest and best conducted of these establishments, which I have twice visited, is Marienberg, (formerly a convent of *dames nobles*;) it stands on an eminence overlooking the town of Boppard, in one of the most picturesque parts of the Rhine, and forms a conspicuous object from the river. In the courtyard is a fountain of clear spring water with iron cups attached, for drinking, and an ascending douche, by which a fine continued stream of water may be directed against the eyes or other parts of the head. A statue to the virgin, to

whom the building was formerly dedicated, stands as a memento of by-gone times in a niche over the door. The apartments (on either side of spacious corridors) are neatly and conveniently fitted up, the price varying according to the accommodation. A neat bed room with board, and the use of the baths, being about two Frederics d'or a week, the fee to the director depending upon the patient's circumstances, the nature of the case, and the duration of the course. There is a large and cheerful reading-room, commanding a view of the Rhine, and supplied with newspapers and periodicals; adjoining is the refectory, where all the patients assemble at dinner. The baths are on the lower story, sunk in the ground. They contain clear water, about four feet deep, of the natural temperature, and are sufficiently spacious to admit of the bathers moving freely about. Patients are let down through a trap door, in a few seconds, from the corridors near their rooms on the first and second floors, by means of a chair and windlass, as it would otherwise take them some time to reach the baths. About 150 persons can be accommodated at the same time. The dinner consists of soup, roast or boiled meat, potatoes and other vegetables, cutlets, and plain puddings; the only beverage allowed being pure

water, of which there is a plentiful supply of bottles upon the table. Bread and butter, and cold milk and water, are allowed for breakfast; and the same for supper, with the addition of stewed prunes, pears, or other fruit.

Besides the douches in the house, there are, in an adjoining building, the Wellenbad, (wave-bath,) which is used in certain cases of local debility, and two or three douches in the environs; one being at the Hermitage, in a picturesque situation at the foot of the Hunds-Drucken hills, about a mile and half distant, to which the patients must walk, and, having been douched, must also return on foot. The water of the douches falls from a height of from ten to twenty feet, through tin tubes, the diameter of which varies from two to three inches, so that a powerful column of water falls upon the part of the body exposed to its action. On the back, abdomen, and chest, the stream is generally made to fall obliquely. Dr. Schmitz, the director of this establishment, is also the editor of a journal which gives an account of the progress of the water cure in Germany.\*

\* Mr. Mayo, lately surgeon to the Middlesex Hospital, who had been long in a bad state of health, resided some time at Marienberg, to superintend the treatment of English patients; but in consequence of disagreements, in which it was the general opinion

The mode of life, and method of treatment, do not materially vary at any of these places; but the coarse nature of the diet at Graefenberg is a just subject of complaint, the dinners being generally composed of beef done to rags, cucumbers in salt and water, acid sauces, and heavy dough puddings. "Hares, coarse, dry, and tough, being first boiled, then baked, baked pork, baked goose, baked duck, and baked sausages, help to vary the repast. Add to this, old mutton, foetal calf, and cow beef *stewed in vinegar*, succeeded by rancid ham served with mashed *gray geas*." "Add, moreover, that the veal, hare, &c. is constantly either mouldy or putrescent, and that the bread is invariably perfectly sour, and the reader will readily acknowledge that here is an assemblage of savours, flavours, and odours, exceedingly well calculated to give him an indigestion who never had one before. The food is so insufferably bad, that a party of gentlemen, after having stood it as long as they possibly could, were literally compelled to spit it out of their mouths, and retire in order

that Dr. Schmitz behaved in an improper manner, and refused to adhere to his engagements with Mr. Mayo, availing himself of the circumstance of the paper not having been signed, that gentleman, and all the English inmates, left the establishment in a body for another in the town, the Mühlbad.

to buy and cook, as well as they could, themselves sufficient food for their dinner."

"It cannot be doubted," observes the author\* from whom I have extracted the above list of delicacies, "that this wretched diet keeps the patients much longer under treatment than would otherwise be required, and that in many instances it obstructs the cure altogether." Priessnitz, however, is said to be willing to prove that his patients are able to digest, without inconvenience, substances which at other times would disagree with them, though doubtless the true reason is assigned by Dr. Johnson, that *bad food is cheaper than good*. Everything of a stimulating nature, as spirits, wine, coffee, tea, &c. is prohibited.

Although bathing is the most essential part of the treatment, the drinking copiously of cold spring water is equally enjoined. Some persons drink as many as twenty goblets a day, though it is seldom that more than twelve are prescribed. In some instances it is deemed advisable to recommend the preliminary use of a few cool or tepid baths, previous to bathing in the water at its natural temperature; but the usual mode of proceeding is as follows: Each patient is awakened at about five in the morning by an attend-

\* Hydropathy, by Edward Johnson, M.D.

ant, by whom the process of *emallottage*, or wrapping up, is performed. A blanket or woollen covering is first bound round, so as to envelope the whole body, the face only being left free; over this is placed an eyderdown covering; over this, again, a second blanket is bound round the body, which, thus enveloped, appears to about twice its natural size. In a short time copious perspiration is induced; the window of the room is then thrown open to admit fresh air, and cold water is given to the patient at intervals, to supply the waste produced by the perspiration, and to prevent him from being weakened by its quantity. When the perspiration has continued for the period that is deemed sufficient, the coverings are taken off, except the original blanket, a cloak being thrown over the patient and slippers placed on his feet; he descends quickly from his room to the bath, and first dipping his hands and face for a second or two, throws off the blanket and plunges into the water at a temperature from 9° to 12° R., while the perspiration is still streaming from the pores of his skin.

The duration of the bath is only a few seconds in most instances; some persons, however, remain in for a longer period, in brisk motion, and rubbing the surface of the body. On quitting

the bath the skin presents the same appearance as a boiled lobster. After having been dried by friction with a sheet, the patient dresses, walks about for an hour, drinking two or three glasses of cold water, and then goes "to breakfast with what appetite he may." The time between breakfast and dinner (at twelve or one o'clock) is occupied in walking, reading, drinking cold water, &c. At Graefenberg many of the patients were formerly subjected to a repetition of the sweating and bathing process in the course of the day; this is, however, now, seldom the case; neither are patients sweated so profusely as two or three years ago.

In some cases, instead of being first wrapped in the blanket, a sheet dipped in cold water and wrung out is used, and over this a blanket and other coverings are bound round the body. The application occasions shivering for the first minute or two, but the body soon becomes warm; and, from evaporation being prevented, the wet cloth acts as a fomentation, and the perspiration is not so profuse. The sheet is preferred to the blanket, in cases of irritability of the surface, where the skin does not act freely, and in weakly individuals. In some of the more recent establishments, the wet sheet is even made almost entirely to supersede the blanket. Local baths

to various parts are likewise very commonly employed, either alone or as an adjuvant to the general treatment. Hip or sitz baths, in which the patient is seated in the water with his legs over the edge of the *baignoire*, are of very frequent use, especially in cases of relaxation of the pelvic viscera, discharges, piles, constipation, &c., water injections being also used. When employed for a short time, the action of the sitz bath is tonic and bracing; when for a longer period, by the reaction which is induced on quitting the bath, it is a powerful derivative, and is used to relieve congestive states of the brain or other viscera. In some states of nervous excitement, head baths are employed, the patient lying upon his back with his occiput in a vessel of cold water. Compresses of wet linen are likewise frequently recommended to be worn on the epigastrium or other parts, for the removal of abdominal obstructions, fixed rheumatic pains, &c. When the wet cloth is frequently renewed, and evaporation freely allowed to take place, it is one of the most efficient means in the reduction of inflammatory action, especially in the skin or external parts, and has from time immemorial been employed for this purpose, in private practice and in public institutions. The simply dressing ulcers and wounds with a bit of linen

steeped in cold water, as formerly recommended by Dr. Macartney, has been long employed in some of the London hospitals. Where, however, the wetted compress is allowed to remain on beneath the clothing, its action is analogous to that of a poultice, or fomentation, and is consequently derivative.

It is well known that the impression of cold water or cold air to the surface of the body, throws the blood upon internal organs, which relieve themselves of the undue quantity, under the consequent reaction, when the application of the cold is discontinued, and a glow, frequently with perspiration, is produced. The sudden passage of the body, while its surface is heated or in a state of perspiration, to a very cold medium, is generally considered, and very justly so, as highly dangerous; but in the cold water treatment, it is seldom found to be productive of prejudicial consequences, when under proper superintendence. On the contrary, a direct increase of bodily vigour and of the appetite is commonly experienced on leaving the bath.\* It must,

\* "The cooling of the body," says Liebig, "by whatever cause produced, increases the amount of food necessary. The mere exposure to the open air in a carriage, or on the deck of a ship, by increasing radiation and vaporization, increases the loss of heat, and compels us to eat more than usual. The same is true of those who

however, be borne in mind, that in these cases the heat of surface and perspiration are of a passive nature, and not produced by exercise, by which the whole body is heated and the circulation accelerated, in which state a person could not go into a cold bath without great danger. In fact, the practice is very analogous to that which was adopted by the Romans, who plunged into the *baptisterium* or cold bath, after leaving the vapour or hot one: and also by the Russians and other nations at the present day. "The heat of the vapour," says an author who has treated of the subject, "to which the bather is exposed, is from 122° to 132° Fahrenheit. After the expiration of a quarter of an hour, or even double that time, when the body is in a profuse sweat, it is washed with soap and water, and gently switched with small birch brooms; affusions of tepid and finally of cold water are practised, by pouring buckets full 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

are accustomed to drink large quantities of cold water, which is given off at the temperature of the body of 99·5. It increases the appetite, and persons of weak constitutions find it necessary, by continued exercise, to supply to the system the oxygen required to restore the heat abstracted by the cold water.

stream, or even roll in the snow." Acerbi states, "that almost all the Finnish peasants have a small house built on purpose for a bath: the apartment is usually dark, with only a hole at the top. They remain for half an hour or an hour in the same room, heated to 167° Fah. The Finlanders will sometimes come out 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 and unyoking, and fetching provender for the horses, or in anything else, without any sort of covering, while the travellers sit shivering with cold, though wrapped in good wolf-skin. The Finnish peasants pass thus instantaneously from an atmosphere of 167° Fah., 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 affected by rheumatism by the most trifling wind that blows."

"The Indians of North America," continues the same author, "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 into the ground, the tops of which they twist together, so as to form a rotunda, and then cover it with skins and blankets, so accurately, that the external air is completely excluded. The space left for the introduction of the body of the person about to take the bath is closed as soon as he gets in. In the middle of this small apartment they place red-hot stoves, on which water is poured until a steam arises that produces a high degree of heat. The effect on the person enclosed 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 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. The sudatory is often resorted to for the purpose of refreshment, or to prepare for the transaction of any business which requires unusual deliberation and sagacity.”\*

In these instances, the time the person remains in the cold is not sufficiently long for the pro-

\* Bell on Baths, &c. Philadelphia.

duction of its depressing effects, which can be better resisted in proportion to the previously high temperature on the surface of the body. Hence, a person whose body is moderately warm, or whose skin is in a state of passive perspiration, would experience less inconvenience and danger from going into a cold bath, than one whose skin is cool, or when its vital powers are depressed. The advantage of cold affusion in fevers, when the heat of the body is steadily above the natural temperature, is well known, and is a further illustration of the same principle.

In Great Britain, the regulation of the functions of the skin by bathing, especially the use of the tepid bath, has been more neglected than in perhaps any other country. A vast proportion of persons, both in the metropolis and in the country, though scrupulously particular in the ablution of visible parts of the body, as the face, neck, and hands, seldom or never think of taking a general bath ; and notwithstanding the greater density of its atmosphere, and the number of its inhabitants, which should render the use of the bath more imperative, London possesses but few facilities for bathing, in comparison with many of the continental cities, where the baths are numerous, well arranged, and at a price which puts them within the reach of all. It appears,

however, that a greater degree of attention is now directed to this important circumstance, the number of public baths having increased in London within the last few years.

In fact, when we consider the extent of surface occupied by the skin, its varied uses, both as the chief organ of sensation, in which the ultimate ramifications of the blood-vessels and nerves terminate, and also as that in which the important functions of absorption, perspiration, and the secretion of the sebaceous matter, by which its surface is lubricated, are carried on; its analogous office to the lungs, in favouring the decarbonization of the blood, and its extensive sympathies with other parts, especially the mucous membranes of the air passages of the alimentary canal and the kidneys, we cannot fail duly to estimate the importance of bathing, as the means best adapted both for maintaining this organ in a healthy condition, and also of rectifying many disordered states of the economy; and yet how seldom is it that baths are recommended in chronic diseases! Can it excite surprise, that in individuals who pass months together without taking a bath, or perhaps even without washing the surface of their bodies (as is the case especially with the poorer classes of the community) the functions of the skin should become materially

impaired, its circulation torpid, its secretions obstructed and vitiated, frequently giving rise, by their re-absorption, to deranged states of the health, of which the cause is seldom ascertained, and which the practitioner vainly endeavours to remove by the internal administration of medicines.

Among the numerous patients who daily apply for relief at the various hospitals and dispensaries, and whose skin is generally dirty and in a disordered condition, how rarely is it that a bath or ablution is ordered ! It is true, that the recommending baths to these patients as part of the treatment of their diseases would be of little use, so long as the medical institutions in England are so indifferently supplied with them as at the present time. But even in private practice, where there would be no obstacle to the freer use of baths, how seldom do they form part of the treatment, unless there should happen to be any existing disease of the skin ! I am convinced, that in many instances, the digestive powers become deranged, and the general health undermined, from a neglect to pay proper attention to the state of the skin ; that a large proportion of the catarrhal, rheumatic, and nervous affections, so prevalent in the variable climate of Great Britain, might be traced to the same source ; and that the tendency

to these complaints, as well as to pulmonary consumption, would be materially lessened, were persons, while in health, accustomed to attend to the functions of the skin, by the employment of bathing and cold ablutions more frequently than is generally the case. Many people, it is true, who perhaps never take a bath, yet enjoy good health, for the influence of habit will often enable the body to support many things that are generally prejudicial. But, on the other hand, there is no doubt that many suffer from various unpleasant sensations and disordered states of health, which might be prevented by the more frequent adoption of the practice.

The cold-water treatment employed in proper cases strengthens the nervous and muscular systems, gives tone to the body generally, and to the skin in particular, consequently there is a greater inclination and ability for exercise, a diminution of the undue susceptibility to atmospheric changes, and to morbid impressions on the nerves, which in a high state of civilization are so frequently productive of disordered states of health. The pure air, bodily exercise, plain diet, the drinking freely of water, and consequent copious excretion of fluid, by means of the skin and kidneys, must tend powerfully to renew the mass of blood, and to eliminate noxious matters

which sometimes remain long in the circulation and give rise to intractable diseases. A vitiated state of the blood, as the cause of disease, has in fact been more overlooked by English than by continental practitioners, though even abroad it is only of late years that due attention has been sufficiently directed to this point. A physician of eminence (Kreysig) observed, " Physicians are in the habit of regarding the solid parts as the primary agents of life, to which the fluids are subordinate ; but, on the contrary, the blood and the nervous substance are the primitive and essential instruments of all the organic functions, while the solid parts occupy an inferior grade, and are but of secondary importance in disease. The elements of general and internal disease, or the morbid predispositions which form the most important objects of treatment, may then all be reduced to vitiated states (*dyscrasies*) of the blood and lymph, or to derangement of the nervous system."

The extent to which the employment of active medicines in chronic disease has been and is still carried in the British dominions, is made a subject of just reproach by foreign practitioners. The public, however, is, in great measure, to blame for the practice, by encouraging the custom of remunerating the great body of practi-

tioners, not according to the attendance, but in proportion to the quantity of medicine sent. To this custom may be ascribed that habit which many have acquired of dosing themselves and their families with active drugs on every slight deviation from a state of health. It is gratifying, however, to observe that of late considerable alteration has been effected, both as regards the doses of medicine and the mode of remunerating professional services; though there is reason to apprehend that a long period must still elapse before the generality of the public and medical men will become aware that their true interest consists in the abolition of this system. The manner in which mercury is frequently used, or rather abused, (though not so much at the present day as a few years ago,) occasions the production and continuance of many nervous, dyspeptic, hypochondriacal, and other complaints, which are generally relieved for a time by the medicine, (in the same way that the dram of spirits or the dose of opium excites for a period those accustomed to their use,) and this temporary relief often tends to keep the practitioner and patient ignorant of the principal cause of the intractableness of the complaint, either till recovery takes place in some instances from the medicine being discontinued, or, what amounts

to the same thing, from the homœopathic regimen,—or from some accidental circumstance, as change of air, scene, &c., or till, in other cases, the general health is seriously impaired, and not unfrequently a foundation laid for the super-vention of organic disease of important parts.

The small and daily repeated doses of this agent, which it is the practice of some to recommend in the majority of dyspeptic cases, and which have been considered to be comparatively harmless, are more pernicious from the gradual accumulation of mercury in the system, than larger doses given at longer intervals, as these are carried off by the increased alvine secretion which they produce. Let me not be misunderstood in the preceding remarks, as wishing to depreciate the proper employment of medicines, and of one of the most efficient agents we possess for the treatment of many diseases, both medical and surgical, in which large quantities of mercury are often exhibited with great advantage; it is against the too indiscriminate use of powerful medicines by some practitioners, and by non-professional persons, especially in cases of stomach and bowel derangement depending upon chronic irritation of the mucous membrane or morbid susceptibility of their nerves, and in nervous affections occurring in the young and

delicate, (the nature of which is so frequently mistaken,) that I am induced thus strongly to protest.

Eruptions, boils, or abscesses, are not unfrequently induced during the water-cure, and these are generally considered by patients as critical and evacuating morbid humours, though in the majority of instances they are but a consequence of the excitement of the skin by the process. In some patients, however, the perspiration eliminated has a strong fetid odour, and the cloths and compresses are not unfrequently stained, and retain a bad smell. Dr. Schmitz mentioned to me a case which fell under his observation of a patient who had taken sulphur-baths seven years previously, but who had not used sulphur since that period. After she had been pursuing the cold water cure for some time, her room smelt of sulphur, a bracelet she wore became tarnished, and her linen was stained a yellowish colour. Other foreign matters have also been detected by analysis in the perspiration and urine of these patients.

A system which acts so energetically upon the constitution may well be enumerated among the *heroic* remedies, and as such requires much discrimination in the selection of cases. As with Cadets de Vaux's method of treating diseases by

hot-water, as well as with many other methods and remedies which have been adopted for a time and have subsequently fallen into neglect, so also the too general application of the cold water cure has been followed by accidents, and an aggravation of the diseases it was intended to remedy. With respect to this point, the author whom I have already quoted observes, " But no rational man can doubt that the possession of scientific knowledge would enable Priessnitz to be much oftener successful than he is, and would lessen the number of his failures. Certainly it would prevent his taking in, and submitting to a tedious treatment, many cases which such knowledge would have taught him at first were perfectly hopeless. *There are many such cases in the establishment at this moment.*"

" And I foresee," further observes this author, " that much evil will at first result, and many a life be sacrificed, from the *apparent* simplicity and innocence of the remedy, inducing persons to practise, both on themselves and others, (to the injury of both,) without the knowledge necessary to do so with success." \*

It is generally acknowledged by the profession in Germany that this mode of treatment is calculated to be of great service in several diseases. I

\* Dr. E. Johnson.

shall content myself with briefly alluding to the principal complaints in which it has been found advantageous, as it is my intention in this place merely to give an *aperçu* of the method. A great number of works have been published of late years in Germany and France, by medical and non-medical persons, in which its advantages and disadvantages are fully considered; and as some among these authors are not prejudiced in favour of or against the treatment, a tolerably accurate idea may be formed from their perusal of its results.

A story is told of a man in Paris who had acquired a great reputation for curing the diseases of lap-dogs by some means which he kept a secret, but which being afterwards divulged, was found to consist in his placing all the animals entrusted to his care in a large open space, giving them to eat only plain meat and bread, and water for drink, of which the pampered creatures at first refused to partake, till their appetites were sharpened by the exercise which he obliged them to take by going in several times in the day with a horsewhip, the dread of which was sufficient to induce them to scamper about in a manner to which they had been previously but little accustomed. By means of this regimen they were generally returned to their fond mis-

tresses sleek and healthy at the expiration of two or three weeks.

Good air, exercise, plain diet, abstinence from stimulating food and drinks, and tranquillity of mind, have been repeatedly insisted upon by medical men and others, as being the most essential means of preventing and obtaining the removal of the majority of diseases which a high state of civilization and luxury induces; and the former of these are more influential with the human race than with others of the animal creation; for though man be an omnivorous animal, and requires a variety in his food, yet by the too free indulgence in highly-seasoned viands and stimulating potations, (the habit of which generally becomes more strong at a period of life when there is less disposition for muscular exertion;)\* not only is the appetite excited and a larger quantity of food taken than is required by the wants of the system, but there is also a greater demand upon the nervous energies; the quality of the blood itself, and consequently of the various secretions, becomes altered, which state of matters cannot long exist without derangement of the health manifesting itself in one way or

\* "An excess of food is incompatible with deficiency of inspired oxygen, that is, with deficient exercise."—*Liebig, Organic Chemistry.*

another. This state of predisposition to disease, and several of the disorders to which it gives rise, might often be remedied by the exercise, early hours, and temperance enjoined as part of the water cure: but it is seldom that persons, so long as they feel themselves tolerably well, have the resolution to break through the chains of habit so far as to adopt even partially these precautionary means, by which the future assistance of the physician might be obviated; but they go on in their accustomed manner, dosing themselves at intervals with medicines to relieve their most urgent inconveniences; and it is not until the germs of disease become rooted in the system, and the symptoms are so strongly manifested as to indicate material interruption in the performance of important functions, that they are awakened to the necessity of sacrificing some of their accustomed enjoyments, and are forced to resort to other than merely palliative means for a restoration to health, which cannot at this period be effected solely by hygienic measures, and which is more effectually accomplished by a combination of these measures with remedies which alter and improve the quality of the blood, and impart tone to the nerves, by their general and gradual operation, than by others which have a more directly exciting effect

upon particular organs. Hence the reason why so many have recourse to mineral waters, and lately to the cold-water plan, which, though more disagreeable in its operation, and more energetic in its immediate action than mineral waters, may yet be applied to several of the diseases of which I have spoken when treating of these remedial agents: especially to some forms of long standing disorder of the digestive organs, particularly when arising from the causes which have been already referred to, viz. repletion, and a too luxurious and sedentary mode of life; some gouty and calculous disorders, which are so often dependent upon the same causes, especially when occurring in the young or middle-aged of full habit and otherwise healthy; inactivity of the skin; complaints arising from exposure to cold and suppressed perspiration,—such as fixed and shifting rheumatic pains and stiffness, which are sometimes so intractable as to resist mineral waters and other means, are likewise not unfrequently cured by this treatment; and the undue susceptibility to atmospherical vicissitudes by which they were perhaps originally caused is often removed, as is also morbid excitability of the nerves, and its consequences, hysterical and spasmodic attacks; long standing intermittent complaints, either in the form of ague, neuralgia,

or irregular muscular movements, after having resisted other measures, have sometimes yielded to this treatment, than which few things could be more calculated to counteract the influence of habit by which similar complaints are so often kept up; syphilitic cases, particularly when of long duration, and when much mercury has been previously taken; a too copious or otherwise disordered menstruation, leucorrhœa, and some other local complaints, as piles, ulcers, &c., depending upon constitutional causes, as well as some cutaneous diseases in which a revulsive action upon the skin is indicated:\* as also relaxation of the system, and other derangements of the general health, may often be removed or mitigated by this plan of treatment.

Notwithstanding, however, the advantage which the water cure may be calculated to produce in some disordered states of the economy, it must not be supposed that it is either so generally applicable or so successful as some of its advocates would have it considered; and the exaggerated accounts of its efficacy which have been given to the world by interested or enthusiastic parties, are likely to do much harm by leading to its indiscrimi-

\* M. Gibert has employed the cold water cure with advantage at the Hospital St. Louis, in some cases of *lepra*, psoriasis, and other intractable diseases of the skin.

nate adoption in cases to which it is but ill-suited. Thus, one non-medical author, after extolling Priessnitz as "one of the greatest benefactors of mankind—one of the most astounding geniuses of this or of any other age—a second Hippocrates—the founder of a system by which all curable diseases, and many declared by the faculty to be beyond the power of their art, are to be cured by the sole agency of cold spring-water, air, and exercise,"\* fills his book with cases of cure of acute and chronic disorders, chiefly from the publications of practitioners of this method, who, like others interested in crying up any particular mode of treatment, would generally abstain from bringing forward instances which would cause the success to be questioned. What, in fact, are the majority of publications written by watering-place practitioners, but one-sided accounts of the virtues of the waters of their particular locality, without any reference to other remedies or other places where the waters may be of equal if not superior efficacy, in the very complaints of which the account is given? The same may be said of many remedies which have at various times been trumpeted forth to the world, and though perhaps efficient in many cases, have nevertheless been subsequently laid aside, in consequence of their not answering the

\* Claridge on Hydropathy.

exaggerated expectations raised by their too enthusiastic advocates. It must also be borne in mind, in estimating the value of remedies, that it is not because a person gets well while pursuing a particular mode of treatment, that his recovery is a necessary consequence of the treatment, as the same result would very often occur under a different mode, or even where no treatment at all was adopted. The *post hoc* is, especially in medicine, very often mistaken for the *propter hoc*. On the other hand, some less partial observers, who likewise followed the practice at Graefenberg, and whose works are favourable to the cold water treatment, state that many patients go away without any amelioration in their condition ; and that a large proportion labour under no more serious ailments than might be remedied by a residence in pure air, by exercise and plain diet. "I expected," says Dr. Ehrenberg, "to find an assemblage of the most rare and serious diseases ; and on almost all sides I saw only robust individuals and fresh-coloured countenances. Several days were required for me to discover any presenting the symptoms of serious disorder of the vital functions. This enigma was not long in being solved. Among the fresh visitors who daily arrived, there were not wanting individuals afflicted with serious diseases, who

for their part would willingly have contributed to increase the fame of Graefenberg; but when the first glance taught Priessnitz that they were seriously ill, he sent them away for the most part. The opportunity afforded itself of my making the acquaintance of some of these unfortunates deceived in their hopes. They had been dismissed in exactly the same terms as we had; though their diseases did not in the least resemble each other, yet they had all been told they would not have strength to go through the treatment.”\*

The acknowledged ability and tact of Priessnitz is, however, frequently insufficient to counterbalance the absence of medical knowledge, as regards the proper discrimination of cases to which this method is applicable; and I have already adduced the testimony of Dr. E. Johnson, that many of the cases at Graefenberg are such as are not likely to be relieved, and the attempt is necessarily a failure. “Priessnitz himself,” continues the author above quoted, “does not conceal, that at most an eighth of the number of those who address themselves to him are admitted into his establishment. One might then expect that all those whom he receives obtain a cure. This, however, is far from being the case; and, for my part, all those whom I saw

\* Exposition des Méthodes Hydriatriques, Paris, 1842.

go away from Graefenberg, left it suffering very much, and several, whom Priessnitz had declared incurable, were cured by Weiss, at Friewaldau."

"Chance furnished me with several opportunities of meeting, a month or two after their departure from Graefenberg, with persons whom I had seen give themselves up to all the exaltation of their enthusiasm, and I was quite surprised at the change which had taken place in their sentiments. A short time ago I met a young Russian officer, with whom I had dined several times at the table of Priessnitz. "And how are your headaches?" said I, after the usual salutation, recollecting his bragging, of which I had been a witness more than once; he replied, with some confusion, "My pains are the same as before; and I should have done much better had I gone to pass six weeks at Teplitz, instead of losing six months at Graefenberg." Another patient told me, that far from being satisfied with his journey, he believed he could date from that period the sufferings which now tormented him much more than those for which he had gone to Graefenberg. A lady who had taken care to avoid the ordinary excesses of Priessnitz's guests could not find terms sufficiently strong to express to me, how disagreeable is the time which follows an hydropathic treatment; the continual

use of cold water had become to her a condition of her well-being, and when she was obliged to limit it in some degree, she experienced the same inconveniences, as those which occur when one is suddenly deprived of a stimulant of which one has contracted a habit."

These instances would be found to be multiplied, if the truth could always be known. Many persons who feel themselves in better health at the time of the treatment, or for some time afterwards while still under the influence of the stimulation, and have consequently spoken highly of it, would, after a period, and on attempting to return to their ordinary mode of life, find the amelioration not to be of so permanent a character as they had expected, though comparatively few would, like the Russian officer, be disposed to recant what they had previously said, and to acknowledge that their expectations had been too highly raised. This remark is equally applicable to the results of other methods which have been unduly lauded by particular individuals, but which an impartial experience in time reduces to their proper level. "*De tout chose il faut voir la fin.*"

"It is evident," observes the same author, "that the laws of prudence are violated each hour of the day at Graefenberg; and this truth is beginning to make its way in the world, for, dining

one day at Neisse with several Prussian officers, I heard one of them say, that they were greatly indebted to Priessnitz, whose treatment had contributed to render promotion more rapid, by hastening the end of some of them, whose names he mentioned ; which, however, did not prevent one of the guests from maintaining that Priessnitz cured every kind of intermitting fever in three days. I then recollected the only two patients attacked with fever whom I had known at Graefenberg, and who were not yet cured at the end of a month or six weeks. One of them had even given up the water, and had recourse to ordinary medicine. This assertion of the guest whom I have mentioned confirmed me in the opinion that Priessnitz is a favourite of fortune, such as is seldom seen ; for, at the moment when at Graefenberg an intermitting fever was braving him by its obstinacy, a few leagues off a panegyrist was found of his sagacity and the infallibility of his method. After my departure from Graefenberg a lady died there ; it was then the custom to ascribe the occurrence of death to the bursting of an abscess internally, but on this occasion also, the opening of the body gave the lie to the favourite explanation. When the relatives inquired what had been the cause of the fatal termination of the case, the answer which they

received was, that the patient's neck was too short to allow her to live. Where could there be found another man who would dare thus to express himself? In what other place than Graefenberg would there exist a public who, instead of perceiving in such an answer the proof of the grossest ignorance, and of an unblushing effrontery, would, on the contrary, discover that of a profound wisdom? What, then, will be the end of this direction of people's minds? What will become of hydropathy, when it shall no longer be in fashion, and when time has torn off the tinsel with which it has been covered? These questions present themselves spontaneously, when on casting an eye over the history of medicine, we see that so many systems which have enjoyed so great a degree of fame, are fallen into complete oblivion. It is a bad sign for hydropathy, that it counts at the present time among its most zealous advocates, people who but lately spoke with enthusiasm in favour of homœopathy. Precisely, because its value has been exaggerated, it will not be able to avoid a reverse of fortune.”\*

The Italians (as well as the English) have a proverb “*Ogni medaglio ha il suo reverso ;*” and on viewing the reverse side, as regards the cold

\* Exposition des Méthodes Hydriatriques, par Ehrenberg et Heidenhain, Docteurs en Médecine, Paris, 1842.

water cure, it will be easy to perceive that the method is not so generally successful as some of its more enthusiastic partisans would lead us to suppose ; and that some of the cases have a fatal termination, even while under the treatment, or within a short time afterwards. Some of the exclusive advocates of the method boast of the small number of deaths which have occurred in the establishments where it is practised, as compared with those which take place where a purely medicinal treatment is pursued ; but the comparison is not a fair one, inasmuch as the number of those who would leave their homes, when in a state of health attended with danger, to resort to a water cure establishment, must be extremely limited. The great bulk of the cases met with in these establishments is composed of persons labouring under various derangements of the health unattended with danger, which is most to be apprehended from the imprudent use of the remedy from which they seek restoration. "Of the patients who resort to Malvern," says Dr. Wilson in his recent work,\* "for the treatment by water, air, exercise, and diet, seven out of ten labour under the interruption of more or fewer of the organs which minister to the digestion of food ;" and in fact the same may be said of a large pro-

\* The Dangers of the Cold Water Cure.

portion of those frequenting the different baths in the summer season, where, out of a large proportion of invalids, the mortality is extremely small on the spot, though many may subsequently find their sufferings aggravated, or have their lives shortened, by an improper use of the waters. With respect to the treatment of acute disease, in which the cold water has been strongly advocated, it may be observed, that in certain cases, its modified adoption as regards the external use could not fail to be beneficial, and the application of the wet sheet repeated according to circumstances, would be the most efficient means of lowering the temperature of the body, and of diminishing fever, being in fact but a variation of the practice recommended by Dr. Curie, of cold affusion in fevers ; the rule to be observed being, *that the surface of the body be steadily above the natural temperature.* Where, however, the feverish excitement depends upon inflammation of an important internal organ, there would be great danger, from the frequent application of cold, of the increase of the inflammation, in consequence of the blood being driven upon the internal organs at a time when the powers of the system, and consequently of reaction, are weakened. Wet compresses, covered over and allowed to remain, are sometimes beneficial as an adjuvant to other

means, as a revulsive, especially in inflammation of the tonsils or sore throat.

Hence it will be perceived that much discrimination is required as to the cases in which the water cure is likely to produce benefit, or to merit a preference over other means of treatment. An unbiassed opinion can only be formed on this point after minute inquiry into all the circumstances and peculiarities of individual cases; and those persons would often find themselves grievously mistaken, who from hearing the account of cases of gout, rheumatism, or any other disease being cured by this or any other exclusive method, were to infer that it is necessarily suited to all or even to the majority of cases of those diseases, which cannot thus be considered in the abstract, but each case must be examined separately in order to modify and adapt the treatment to it according to the varying circumstances and peculiarities. It is true, that as there may be several roads leading to one place, so also in medicine, the same disease may frequently be cured by or subside under different modes of treatment, and it consequently behoves both the practitioner and patient to select the one which is attended with the smallest amount of positive inconvenience, and which requires the least time. Now the cold water treatment is not

only a very unpleasant process, but a long course is in most instances insisted on by those who practise it, and a patient would not have much reason to congratulate himself upon his relief from an ailment, by a two, three, or four months' residence at a water cure establishment, when by medical treatment, or by a properly directed course of mineral waters, he might have been cured in a much more agreeable manner and in half the time. I do not say that this is generally the case, but it is not unfrequently so ; and what I am desirous of advocating is, the necessity of a proper discrimination by unprejudiced practitioners, in the selection of the cases to which different means of treatment may be applicable with the greatest amount of benefit to patients. I have, in the volume to which this account formed the appendix, endeavour to show that mineral waters, which have no ephemeral reputation, but which have been used in all ages, and appear to be specially bestowed upon man as a means of relief from a large proportion of the diseases to which he is subject, present the most natural, efficient, and agreeable mode of treating the majority of chronic diseases. A foreign author observes upon this point: "The evidence of antiquity with regard to the efficacy of mineral waters, the experience of centuries which con-

firms this efficacy, the universal favour in which they are held among all civilised people notwithstanding the difference of medical theories, sufficiently demonstrate that they are of all remedies those of which the reputation is the most justly established. Nature bestows these remedies liberally upon us in order to invite us to have recourse to them in our diseases ; she has consulted, as much as possible, our delicacy, our taste ; she has tempered the virtues and the power of the waters and has adapted them to different temperaments. We obtain from plants and minerals many medicaments, but they almost all require certain pharmaceutical preparations ; whereas mineral waters are always naturally at our disposal ; they contain sulphur, carbonic acid, and neutral salts, which are frequently employed in the practice of medicine. Why, when found in nature's laboratory, should these substances not have an equal degree of power as when taken from that of the apothecary ? Most mineral waters are not harmless ; they cannot be used with impunity in cases where they are counter-indicated, and every year there are persons who become the victims of their imprudence."\*

These statements are further corroborated by the progress of chemistry, which has demon-

\* Patissier, Manuel des Eaux Minerales, Paris.

strated the direct action of solutions of salts and other substances contained in mineral waters, in altering and modifying the condition of the blood and secretions, as well as upon the nervous system, of which point I have fully treated in my works on the German and English mineral springs.

The position of a water cure establishment is a matter of great importance as regards the results of the treatment. It should be in an undulating or hilly country, and an agreeable locality, well wooded and supplied with shade, so as to present inducements to its inmates for walking exercise, without the monotony of a plain and uninteresting country; the water should be of the purest kind, and the supply abundant. The combination of these advantages is found at Boppard, which I have recommended from personal knowledge. There is also an establishment near Coblenz, which is advantageously situated. As, however, there is now abundance of these establishments in England, those persons to whom the water cure is recommended, or who may be disposed to make trial of it on their own responsibility, need not undertake a long journey to Silesia or other parts of the continent. Malvern is perhaps one of the best positions in England for an establishment of this kind, and from what

I have known of Dr. Wilson, I should say that his judgment and experience of the method fully qualify him to superintend the treatment of those cases in which it is indicated. The experience of Mr. Weiss from Friewaldau, now of Stanstead Bury, is likewise very extensive.

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