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ON

THE EMPLOYMENT

OF THE

WATERS OF KREUZNACH.

BY

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REMARKS ON THE EMPLOYMENT OF THE WATERS OF KREUZNACH.

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The German looks upon his mineral springs as the fountains of health, and considers an annual trip to Carlsbad, Marienbad, Wiesbaden, or one of the numberless watering-places of fatherland, of as great and essential importance to the enjoyment or preservation of life, as John Bull regards his three weeks' autumnal visit to Margate, Brighton, or Ryde. It is one of the many traits that preserve the general resemblance of the two great branches of the Anglo-Saxon tree on this side of the Atlantic; and it is evident from the description of Saratoga and other watering-places, by N. P. Willis and kindred spirits, that the cousinhood of North America are fully alive to the value of these temporary migrations. They do not belie their relationship even in this particular. We do not see that the French, or the Italians, or the Spaniards, quit their homes annually, as a matter of course, to obtain a renewal of health. They are more *glebæ adscripti*, and are satisfied with that share of mental and bodily vigour which their permanent place of residence can afford. We need not grudge them this passive contentment. We claim as our birthright the desire for improvement, the onward-striving which pursues higher and better objects, whether in moral, in sanitary, or in political relations; and we think it a privilege legitimately to follow out everywhere the great laws of nature, by which we are told to advance not only as logs on the tide of civilisation, but as bold and manly swimmers, cleaving the waves by the might of a good arm upheld by a living faith. We seek health as one of the great boons of Providence; we seek it, not in frivolous excitement, but in that intercourse with nature and her most lovely or her grandest works, which, above all other restoratives, gives balm and solace to the sufferer.

Geographical position and opportunity have in this, as in many other points, determined the selections which the German and the English each make. Their mode of living and their character undoubtedly render a different regimen necessary in disease; and hence it is not to be wondered at that they each show a preference for a peculiar kind of medication. The vicinity of the bracing atmosphere and water offered by the sea-coast in every part of England, our love for maritime scenery, for shipping and aquatic sports, tempt the Englishman more, and seem more congenial to his beef-eating constitution, than the sulphureous springs of Harrowgate, and the antirheumatic thermæ of Bath. He inclines to regard the latter agencies on a par with the *bouillon* of French cookery, or the *ptisane* of the Gallican *pharmacien*, good in their way, but decidedly unsuited to his cayennised palate. The German, on the other hand, knows nothing of the sea or of shipping; he cannot appreciate the majesty of a storm; nor, all musical though his taste, does he discern the music in its roar. He prefers the mountain forest, with its rivulet and cascade; the broad lime-tree walks, and the wood resounding with the note of the nightingale: he likes his beef boiled to strings, and he prefers his physic well diluted with water, in the shape of a mineral *brunnen*, which he drinks by the quart, under the close superintendence of His Royal and Imperial, Royal, Ducal, or Countly Upper Medical Bath-Counsellorship, the portly Physician and Comptroller-General of Blank-Blank.

The good effects and decidedly medicinal character of many of the mineral springs of Germany are undeniable. Much may be ascribed, and is justly due, in the curative influence they exert, to the change of scene, and absence of the cares of work-day life; but many of the waters are exported; and the volcanic cuisine in which they have been prepared, mysterious as it may be, enables them to produce palpable effects under circumstances which forbid those effects from being ascribed to anything but the dose exhibited. The chemist cannot account for these facts; for doses of the constituents obtained from the druggist, that would produce no results, when exhibited in the combination offered by nature's cookery, often are followed by very marked and indisputable effects. To take a single instance; Pullna water, a favourite and mild purgative, contains as its main constituent sulphate of soda. The dose sufficient to produce a decided effect with an adult is a couple of ounces;

these contain altogether but about ten grains of sulphate of soda and magnesia, besides minute quantities of other salts. It follows, that the mode of combination is a point of great importance to determine the efficacy of a remedial agent; and it may serve as a therapeutic hint, that the prevailing desire to simplify our remedies, and to reduce our prescriptions to a single drug, is one not based upon the example shown us by nature herself. Moreover, it may teach us respect for the wisdom of our ancestors, who, in many respects, understood the art of compounding medicines much better than we do, though they may have been ignorant of the atomic theory, and the laws of chemical combinations.

Since the introduction of steam vessels, and the publication of Sir Francis Head's amusing volume on the *Brunnens of Nassau*, Englishmen are as familiar with most of the watering-places that lie in the route from London to Frankfort, as the Germans themselves. Fortunately, however, for the latter, the London season detains its victims until long after the great majority of invalids have gone through their prescribed course; so that they are not interrupted by the sons of Albion. We therefore rarely see the waters in full operation, or enter into the reality of a German watering-place, with all its minutiæ of drinking and ablution, of diet and regimen; with its gipsy parties and musical reunions, its welcomings and leave-takings. Our acquaintance is consequently but of a superficial character, and is likely to continue so, unless the medical profession of this country make balneology a subject of study, and thus allow it that scientific importance which it legitimately demands.

Recently, attention has been directed to a watering-place which belongs to the range of the Rhine excursionists, and which promises to become a place of much resort with our countrymen, on account of the powerful efficacy of its waters—the Springs of Kreuznach.

Kreuznach is a small town in Rhenish Prussia, situated in the valley of the Nahe, a tributary of the Rhine, which receives it at the well known site of Bingen and Bishop Hatto's far famed Tower. A drive of an hour and a half along vineyards and cornfields, skirting the adjacent hills and the river, conveys the traveller from Bingen to the springs. These are of very ancient repute, on account of their yielding a large produce of chloride of sodium, which is obtained

from them by the ordinary process of evaporation; this leaves behind it a residue known as bittern or mother ley. Both the water in its native state and the residuary matter are employed for medicinal purposes; but it is only the former which is used both for external and internal administration; the latter is almost exclusively employed, diluted, as an external remedy. There are several springs, which vary somewhat in composition and temperature; they all possess a temperature peculiar to themselves, and demonstrating the volcanic character of the soil; and all contain chloride of sodium as the main constituent, with other chlorides and compounds of iodine and bromine.*

The spring known as the Elisabeth Quelle is the most in request for medicinal purposes, as the most powerful. Its temperature is 55° Fahr. throughout the year; the fresh drawn water is perfectly clear and transparent, with a slightly yellowish tinge, and of a salt, bitterish taste; a few bubbles of carbonic acid gas are visible; the water soon becomes dull; numerous small brownish flocculi form and are precipitated, and do not disappear for several days, until the precipitate is completed. The analysis of this water by Bauer, as given in Professor Osann's great balneological work, shows sixteen ounces of the water to contain above ninety grains of mineral constituents, distributed in the following manner:—

Chloride of sodium - -	72.922
Chloride of potassium - -	0.971
Chloride of lithium - -	0.075
Chloride of calcium - -	13.276
Chloride of magnesium -	0.251
Bromide of sodium - -	0.307
Iodide of sodium - -	0.003
Carbonate of magnesia	1.351
Carbonate of strontia - -	0.683
Carbonate of baryta - -	0.299
Carbonate of iron - -	0.199
Carbonate of manganese -	0.009
Alumina - - -	0.021
Silica - - - -	0.313
	90.686

The specific gravity of the water is 1,004.

* To those interested in the topographical and medical history of the German watering-places, we can recommend the Lectures on the Mineral Waters of Kreuznach, by Dr. Sutro, and published by Parker in 1851, as containing a large amount of information.

The process by which the chloride of sodium is extracted from the water necessarily alters the relation of the constituents found in the bittern; while it removes almost all the chloride of sodium, it leaves those elements to which the peculiar effects of the Kreuznach waters are particularly ascribed in a much more concentrated form. This bittern or mother ley is the semifluid residue found in the evaporating pans; it presents a brownish yellow colour; it is translucent and clear, and has a soft soapy feel; its sp. grav. is 1,307 to 1,314. It smells like marine algæ, and has an intensely pungent and acrid taste, which is not effaced from the lips and tongue for some time after it has been applied. It is very deliquescent—a property which renders its transportation in anything but china or glass vessels impossible, as it gradually oozes and makes its way through all porous materials, and through the strongest casks and earthenware jars. It is rarely employed in the concentrated form, but mainly as an adjunct in ordinary water baths, or with the water of other mineral springs. Of late, the bittern has been still further evaporated to dryness, in which state it forms an amorphous light brown mass, of which I present a specimen to the society. Its taste and properties are the same as those of the mother ley, but it offers the advantage of being much more portable. The following is an analysis of the mother ley by Osann. He found sixteen ounces to contain 2625.72 grains, or about one-third of solid matter, distributed in the following manner:—

Chloride of calcium - - -	1577.71
Bromide of calcium - - -	388.72
Bromide of potassium - - -	92.82
Chloride of magnesium - -	38.44
Bromide of sodium - - -	154.10
Chloride of sodium - - -	60.34
Chloride of potassium - - -	17.30
Alumina and suboxide of iron - -	35.66
Crenic and apocrenic acid, and two peculiar resinous matters, with traces of iodine - - - -	216.16
Water of crystallisation and loss -	44.50
	2625.72

The quantitative analysis of the mother ley varies in almost every examination that is made, owing to the accidental variations of condensation, and fortuitous changes produced by the process of extracting the common salt; but

all agree in showing the presence of a large proportion of bromide of calcium. An analysis given by Dr. Prieger, in a work entitled *The Mineral Waters of Kreuznach*, published by Mr. Churchill in 1846, exhibits a considerable difference in the relation of the constituents; it is as follows:—

Bromide of calcium - -	24.12
Chloride of calcium - -	9.29
Bromide of magnesium - -	0.48
Iodide of magnesium - -	0.18
Chloride of potassium - -	0.80
Chloride of sodium - -	1.28
Water and loss - - -	63.85
Total . - -	100.00

Mr. Blyth, the dispenser of St. Mary's Hospital, has had the kindness to make a qualitative analysis of the bittern exhibited, and confirms the fact of its containing bromine. He has also found chlorides of calcium, sodium, and magnesium, but no potassium, and a trace of iron. His tests do not demonstrate the presence in this specimen of any iodine; but we have shown that the absence from our specimen of bittern does not necessarily prove the absence of iodine from the water, or from other bittern. I exhibit, by Mr. Blyth's aid, the test for bromine and iodine made by Mr. Henry's beautiful process, in the following manner:—100 grains of the bittern are dissolved in distilled water, and precipitated with a slight excess of acid nitrate of silver; the precipitate is then well washed, and carefully collected; it is then mixed with metallic zinc and sulphuric acid—both pure—taking care to have a good excess of zinc. When the effervescence has ceased, the salt of silver is decomposed, and the filtered liquor will contain sulphate, chloride, iodide, and bromide of zinc, if these elements be present. It is then evaporated to a small volume, and introduced into a narrow bottle; a cold solution of starch and some ether is added, and then some freshly prepared chlorine water is dropped in carefully; the whole is shaken together, and allowed to stand; if iodine is present, it will be precipitated as iodide of starch, while the bromine will be taken up by the ether, and will float at the top. In the bottle before you, you observe the brown ethereal solution at the upper part, indicating the presence of bromine; while the starch at the bottom retains its translucent whiteness, no iodine being present.

After the foregoing statement of the chemical nature of the Kreuznach waters, and of the residuary bittern, we shall be prepared to examine the medicinal effects; and it will be justly inferred that its action is allied to that of sea-water. Kreuznach has indeed the reputation in Germany of being κατ' ἐξοχὴν the antiscrofulous spring. It is a powerful tonic and stimulant of the lymphatic system, and is peculiarly beneficial in torpid states of the constitution, and diseases based upon such a foundation. Scrofula, in all its forms of early or adult life, with the secondary maladies that spring from that prolific source, finds an antagonist of undoubted power in the Kreuznach waters. The chlorides and iodides are the very remedies which, in other combinations, we are in the daily habit of prescribing. We here find an additional antiscrofulous agent, the bromide of sodium and potassium, which manifestly increases the therapeutic effect of the other constituents. Accordingly, the nosological list—the bill of fare of the Kreuznach physician—which is found most readily to yield to the administration of Kreuznach water or bittern, comprises scrofula and tuberculosis in every variety, manifest or latent, as swellings of the external glands; diseases of the eyelids and eyes, or the external meatus; scrofulous and atonic affections of the mucous membranes of the respiratory, alimentary, or urogenital tracts; hence also leucorrhœa, and various forms of uterine affections connected with malnutrition, are diseases well adapted for the application of this remedy, generally or locally. Chronic swellings of the bones, caries, tumor albus, are not only benefited by the waters, but yield more rapidly than to the ordinary mode of treatment. The Kreuznach waters have been also found very beneficial in scrofulous cutaneous eruptions, and in atonic states of the kidneys and bladder. The list of diseases is long; but it is rendered so rather by the refinement of science, than by that natural pathology which teaches us that there is essentially but little difference between these affections, beyond the accidental localisation of the same depraved tendency. Hence let no one say that we laud these mineral waters as a specific or a panacea: they are antiscrofulous remedies with which we are familiar, but in a guise under which they have not been hitherto known to us. We may, however, not unreasonably extend the application of the Kreuznach waters to numerous affections not necessarily allied to the scrofulous constitution;

the influence of warmth applied to the entire surface in the shape of a medicated warm bath, of warm vapour inhaled in breathing, of enemata, or of the vaginal douche, is curative or restorative in a variety of ailments, especially when combined, as it will be at a place devoted to the search of health, with appropriate regimen and diet.

The value of iodine compounds given internally, or applied to the surface; the remedial power of warm baths, especially when containing chloride of sodium, has been demonstrated in numerous diseases characterised by, or inducing, degenerations of the tissues. We all know their efficacy in chronic rheumatism and its sequelæ, in secondary syphilitic affections, in atonic gout, and lead or mercurial poisoning. Their action is manifestly by stimulating the capillary circulation of the cutaneous surface, or of the kidneys; or, as Mr. Melsens has shewn in reference to lead poisoning, by a direct eliminative effect upon the noxious element. The morbid states alluded to, and their multiform complications, therefore come legitimately under the influence of the Kreuznach waters; and the progressive reputation they have enjoyed since Professor Liebig first shewed them to contain bromine, is fully borne out by the experience of ordinary therapeutics. It is not my object at present to enter into minute detail with regard to the medicinal powers of the waters in the protean forms of disease alluded to, but I may be allowed to direct attention to the remedial efficacy of the Kreuznach waters, in a species of malady in which hitherto the ordinary drugs at our disposal have failed to achieve a cure: it is the more a pleasant duty, as in recommending the Kreuznach waters for this special purpose, we do so on good evidence, based upon *a priori* grounds, which our knowledge of their chemical constitution affords, and upon the results of the practical experience of an eminent physician, Dr. Prieger, jun.* Moreover, the maladies to which we allude extensively affect those orders of society which would possess the means of visiting a foreign watering place; and, while conferring a boon on such sufferers of the higher classes, we may hope to induce some of our colleagues to employ remedies similar in constitution to the Kreuznach bittern, and thus to deter-

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* Ueber Hypertrophie und die harten Geschwülste des Uterus und seiner Anhange, so wie den Einfluss des Kreuznacher Wassers auf dieselben. Von Dr. Oscar Prieger: 1853.

mine whether or not, by following the example shewn us by nature, we may spread the advantages that must otherwise accrue to but a very limited number among a more extended sphere. I may remark parenthetically, that the concentrated bittern itself has recently been imported by the German chemists Hilgenberg and Schacht of Houndsditch. They find it most convenient to keep it in solution; but it is probable that by means of a suitable arrangement, and by the employment of well stoppered glass bottles, the dry salts might become more generally accessible, as the bulk of the solution renders its transport difficult and costly. I am also informed that Messrs. Taylor of Vere Street have taken steps to procure a supply of the bittern.

To return: the affections to which I have alluded as not having hitherto been amenable to treatment, are fibroid tumours of the uterus and ovaries, and other hypertrophic conditions of those organs. It appears from the cases recorded by Dr. Prieger, jun., in an interesting pamphlet recently published, that under the use of the Kreuznach waters they may be softened, reduced, and even entirely dispersed. There is nothing in the structure of the tumours which renders such a result improbable. Until they have become very large, they are freely traversed by blood-vessels, the agents of all advancing or retrograde metamorphoses; and as long as the organic connexion between the morbid growth and its matrix is freely kept up, we may reasonably hope that our dynamical remedies may exert an eliminating effect, provided we can hit upon an agent likely to stimulate the system in a manner proportionate to the existing disease. Any one who will take the trouble to go to the museum of St. George's Hospital, and examine some injected specimens of uterine fibroid tumours, will find that they may be plentifully supplied with blood-vessels. The more extensive their growth, the more they seem to be placed beyond the pale of the organisation; and they gradually become, like foreign bodies, a source of mechanical irritation, or passive obstacles to the organic functions: they then necessarily cease altogether to react upon internal remedies. But I hold that the structure of these fibroid tumours is a further explanation of the comparative facility with which they yield to the resolvent action of the Kreuznach waters. They are, as I have attempted to show elsewhere, essentially an hypertrophic condition of the true

uterine tissue, differing from it by that metabolic power which gives a morbid impulse, but identical with it in those points which the microscope and chemical reagents reveal. I the more confidently put forward this view, as I find it corroborated by a recent writer in the Reports of the Pathological Society for 1852-3. Dr. Bristowe there demonstrates in a most satisfactory manner, that the so-called fibrous tumour is absolutely identical in point of structure with the walls of the uterus, whether examined in the unimpregnated or impregnated condition.

The evidence which Dr. Prieger, jun., brings forward in proof of these tumours being amenable to treatment by the Kreuznach waters, is of a character to demand our serious attention. Those who will study his paper, will be constrained to conclude that he thoroughly understands his subject, and that he is not led away by that species of enthusiasm which frequently prompts the administrators of favourite remedies to regard them as agents of an universal efficacy. His diagnosis is cautious and well founded; and he gives us accurate statistical details of his experience.

The results of the application of the Kreuznach waters in eighty-six cases of hypertrophic states and fibroid tumours of the uterus and its appendages, which have been under his care, are as follows:

Thirty-one were entirely cured; of these, two were hypertrophy of the entire uterus; sixteen, partial hypertrophies of the uterus; six, fibroid tumours of the uterus; and seven, tumours of the ovaries. In each case, no trace of the disease remained at the conclusion of the treatment.

Twenty-nine were partial recoveries; the troublesome symptoms having been removed or ameliorated, and the swelling or tumour having been much reduced. Of these, three were hypertrophy of the entire uterus; four, partial hypertrophy of that organ; nine, fibroid tumours of the uterus; five, fibroid tumours of the ligaments; six, ovarian tumours; and two, ovarian tumours complicated with hypertrophy of the uterus.

Nineteen cases were benefited so far that the continued growth of the morbid formations was arrested, without any or but a trifling reduction in size. Of these, two were hypertrophic states of the uterus; eight, fibroid tumours of the uterus; four, fibroid growths of the uterus; and five, ovarian tumours.

seven cases presented no change whatever either in the size of the tumours, or in regard to the morbid symptoms.

The method pursued and the duration of treatment by the Kreuznach waters necessarily varies according to the duration and extent of the disease, and according to the constitution of the individual. One remarkable and well authenticated fact regarding its influence upon the organism, is the continuance of the peculiar action it has set up, long after that action has been initiated, and the remedy has been discontinued. Dr. Prieger has repeatedly observed that after the conclusion of the course in August or September, the progressive diminution of the local affection continues until the following spring. Thus in a lady who had employed the baths for eight weeks, on account of an ovarian tumour, previous to the 1st September 1851, Dr. Prieger was unable to perceive a notable diminution of the tumour when she quitted Kreuznach, nor could her own medical attendant in the following January detect a marked change; still, a few months later, the tumour was found to be much reduced, and she had made use of no remedies in the interval but an occasional local application of the Kreuznach water.

We have alluded to the different modes in which the Kreuznach waters are exhibited. A few more detailed remarks on the subject may be acceptable. When administered by the mouth, the water may be taken by itself, or combined with milk, whey, or other mineral waters, and either warm or cold; the quantity varies from one to six beakers, or from a few ounces to two and more pints; it is taken in the morning at short intervals, and moderate exercise is enjoined during the potations. The baths are commonly employed tepid at a temperature of about 90° F.; at the commencement of the course the patient is ordered the use of the water only, while its power is subsequently and progressively increased by the addition of more or less of the bittern. Dr. Prieger* informs us that it is usual to commence with one quart, or about 4 lbs. of the latter for baths for adults, while a less quantity, proportioned to the age of the individual, is used for children. If the inspissated bittern be employed, we should use from one to two pounds for the bath of an adult. The increase in the quantity of bittern in the baths must be gradual; and in the same

* The Mineral Waters of Kreuznach, etc., p. 21. By Dr. Prieger.

way, after the climax has been reached, it is progressively diminished; "for the whole object," to use Dr. Prieger's words, "of this management would be destroyed by a too quick reduction of the effective power, and before the accustomed irritation of the skin" (a species of critical eruption) "had subsided." The bath is rarely used more than once a day, or for more than from five to twenty minutes at a time; its action is accelerated by friction of the affected parts, or of the whole body. Rest is enjoined after the use of the bath in very delicate individuals, while gentle exercise is recommended to those of a corpulent or more robust habit. The topical applications vary equally in strength and duration according to the constitution of the individual patient; and when applied as gargles, as enemata, or as vaginal injections, we must necessarily use some judgment in regulating the minutiæ of temperature, concentration, and frequency of exhibition.

My own personal experience of the advantages derivable from the waters of Kreuznach has hitherto been so limited, that I should not have brought the subject under notice, if I had not been provided with more extensive evidence than my practice has supplied. So far, however, as it goes, it confirms the statements of the authors quoted. In our case of a gentleman in whom an atonic condition of the genito-urinary system, accompanied by azoturia, had been brought on by indiscriminate medication for gonorrhœa, and where steel, quinine, and similar remedies, had failed to produce a cure, a course of the Kreuznach waters, followed at my suggestion, effectually removed all morbid symptoms. In another instance, a young lady, whom I saw in consultation with Mr. Toulmin of Clapton, and who had been suffering from a long standing chronic tumefaction of the condyles of the femur, was restored to perfect health by a six weeks' visit to Kreuznach, and a careful attention to the rules laid down by Dr. Prieger, junior. I have recently had occasion to recommend the use of the Kreuznach bittern in the case of a young lady in whom the ordinary exhibition of iodides externally and internally failed to remove a very sluggish glandular tumour of the neck. Its brief employment, however, and the subsequent removal to the sea side, does not enable me to quote the case as one of cure. I mention these cases rather with a view to proving that my remarks proceed from a conviction of the extreme value of the Kreuznach waters and the bittern, than for the purpose

of strengthening the arguments of men of larger experience. It appears that the bittern has been employed somewhat extensively at an infirmary for scrofulous children, erected by Mr. Sidney Herbert in Wilton, Hants. If so, it would be desirable that the results of its effects should be made known to the profession, as we might thus be enabled to form a more conclusive estimate of its remedial powers apart from the effect produced by the change of scene and air when patients visit Kreuznach itself. If members of the Harveian Society should have acquired any experience on the employment of this remedial agent, I should be happy to find that these cursory observations succeed in eliciting their views on a subject which I have ventured to introduce to their notice perhaps with less completeness than it demands, but with an earnest conviction of its importance in a scientific and directly practical point of view.

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